comprising such works as, from their rarity or value, should not be lent out, all unbound periodicals, and such text books as ought to be found in a library of reference, except when required by Committees of the Institute, or by Members or holders of second class stock, who have obtained the sanction of the Committee. The second class shall include those books intended for circulation.

ARTICLE VI.—The Secretary shall have authority to loan to Members and to holders of second class stock, any work belonging to the SECOND CLASS, subject to the following regulations:

Section 1.—No individual shall be permitted to have more than *two books* out at one time, without a written permission, signed by at least two members of the Library Committee; nor shall a book be kept out more than TWO WEEKS; but if no one has applied for it, the former borrower may renew the loan. Should any person have applied for it, the latter shall have the preference.

Section 2.—A FINE OF TEN CENTS PER WEEK shall be exacted for the detention of a book beyond the limited time; and if a book be not returned within three months, it shall be deemed lost, and the borrower shall, in addition to his fines, forfeit its value.

Section 3.—Should any book be returned injured, the borrower shall pay for the injury, or replace the book, as the Library Committee may direct; and if one or more books, belonging to a set or sets, be lost, the borrower shall replace them or make full restitution.

ARTICLE VII.—Any person removing from the Hall, without permission from the proper authorities, any book, newspaper, or other property in charge of the Library Committee, shall be reported to the Committee, who may inflict any fine not exceeding twenty-five dollars.

ARTICLE VIII.—No Member or holder of second class stock, whose annual contribution for the current year shall be unpaid, or who is in arrears for fines, shall be entitled to the privileges of the Library or Reading Room.

ARTICLE IX.—If any Member or holder of second class stock, shall refuse or neglect to comply with the foregoing rules, it shall be the duty of the Secretary to report him to the Committee on the Library.

ARTICLE X.—Any Member or holder of second class stock, detected in mutilating the newspapers, pamphlets or books belonging to the Institute, shall be deprived of his right of membership, and the name of the offender shall be made public.

THE

NEW AND IMPROVED PRACTICAL BUILDER.

THE FIVE ORDERS

OF

ARCHITECTURE;

CONTAINING

THE MOST PLAIN AND SIMPLE RULES FOR DRAWING AND EXECUTING THEM IN THE PUREST STYLE;

FOR THE

Use of Workmen;

EXHIBITING THE MOST APPROVED MODES OF APPLYING EACH IN PRACTICE, SUITABLY TO THE CLIMATE OF GREAT BRITAIN.

INCLUDING AN HISTORICAL DESCRIPTION OF

GOTHIC ARCHITECTURE,

ILLUSTRATED WITH SPECIMENS SELECTED FROM THE MOST CELEBRATED STRUCTURES NOW EXISTING, AND NUMEROUS PLANS, ELEVATIONS, SECTIONS, AND DETAILS OF VARIOUS BUILDINGS, EXECUTED BY ARCHITECTS OF GREAT EMINENCE.

TO WHICH ARE ADDED,

TREATISES ON PROJECTION, PERSPECTIVE, FRACTIONS, DECIMAL ARITHMETIC, &c.

IN ORDER TO ASSIST THE STUDENT IN DRAWING ARCHITECTURAL OBJECTS,

CONCLUDING

WITH AN INDEX AND GLOSSARY OF THE TERMS OF ART, &c.

ILLUSTRATED BY NUMEROUS ENGRAVINGS BY ARTISTS OF THE FIRST TALENT.

VOL. III.

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PREFACE.

THE very favourable reception and extensive sale of the two preceding Volumes of the "NEW PRACTICAL BUILDER,"—the first on "PRACTICAL CARPENTRY, JOINERY, and CABINET-MAKING;"—and the second, on "MASONRY, BRICKLAYING, ORNAMENTAL PLASTERING," &c., demands our most grateful acknowledgments, and has induced the proprietor to engage the same individuals, with the aid of other eminent professional gentlemen, to arrange and prepare the third and concluding Volume on Practical Architecture; and which, together, will form the most complete and comprehensive Treatise on PRACTICAL BUILDING, in all its various branches, ever presented to the Public.

The present volume contains an extensive and valuable Treatise on the FIVE ORDERS OF ARCHITECTURE, upon which the Decorative part of the science so much depends. The peculiar features and character of each Order are separately treated and critically compared; and the most approved modes of applying them in practice fully explained and clearly elucidated. The description of the FIVE ORDERS is followed by a series of practical rules and directions applicable to Building in general, in which the *fitness, proportion,* and *character,* of the various component parts of Architectural Structures are carefully investigated and compared; consisting of *Halls, Rooms, Walls, Ceilings, Stories or Suites of Apartments, Roofs, Door-ways, Floors, Passages, Staircases, Fire-places, Recesses, Chimneys, Niches,* &c. &c., including rules and directions for determining the *proportions* of Apartments; and also the most approved application of *Ornamental Decoration,* with Critical Remarks on the symmetry and beauty of Buildings, the proper choice of Situations and Soils for Country Residences, &c.

To which is added, an historical description of GOTHIC ARCHITECTURE, showing its Origin, and also a Comparison of the Gothic Architecture of England, Germany, France, Spain, and Italy; together with the first, second, and third periods of the Pointed Arch or Gothic style, and which is fully explained and illustrated by numerous examples and details, drawn from the best Authorities. And in order to assist the Student in drawing architectural objects with ease and accuracy, as well as in estimating the value or contents of Materials used in the construction of Buildings, compendious Treatises are given on PROJECTION, PERSPECTIVE, and DECIMAL FRACTIONS, &c.

The Illustrations and Examples given in this Work have been carefully selected from the most approved Specimens, both ancient and modern, and include Plans, Elevations, and Sections of various well-known and admired Structures, consisting of *Cathedrals, Churches, Chapels, Halls, Mansions, Villas, Asylums, Mausoleums, Prisons, &c.* most of which have been executed by Architects of great skill and eminence in their profession, amongst whom we make honourable mention of WYATVILLE, SMIRKE, SOANE, RENNIE, TELFORD, PERRONET, CLARKE, SHAW, INWOOD, ELSAM, JOHNSTONE, and NICHOLSON. The whole concluded by an Index and Glossary of the Terms of Art, &c. &c.

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BOOK I.

INTRODUCTION,

EMBRACING THE OPINIONS OF THE MOST DISTINGUISHED PROFESSORS IN THE ART OF BUILDING, AS PRESENTED, AT DIFFERENT PERIODS, TO THE SCIENTIFIC WORLD, BY SIR WILLIAM CHAMBERS, AND OTHER EMINENT ARCHITECTS, ANCIENT AND MODERN; FROM WHICH THE STUDENT, AS WELL AS THE AMATEUR, MAY COLLECT EVERY INFORMATION REQUISITE TO PROPORTION; AND BE ENABLED TO DRAW AND EXECUTE ALL THE VARIOUS PARTS OF THE SEVERAL ORDERS, WITH ACCURACY AND TASTE, IN THE PUREST STYLE.

THE ORDERS OF ARCHITECTURE constitute the basis upon which, chiefly, the decorative part of the science is founded, and towards which, the attention of the architect must ever be cherished, even where the *Orders* are not introduced: for, in them originate most of the forms used in decoration; they generally regulate the proportions; and to their combination, multiplied, varied, and arranged, in a thousand different ways, architecture is indebted for its most splendid productions.

These *Orders* are, in reality, different modes of building, supposed to have been originally imitated from the primitive huts; being composed of such parts as were essential in their construction; and, afterwards, adopted in the temples of antiquity, which, though at first simple and rude, were, in the course of time, and by the ingenuity of succeeding architects, wrought up and improved to such a pitch of perfection, on different models, that each was, by way of eminence, denominated an ORDER.

Of these there are *Five:* three, said to be of Grecian origin, and are called Grecian *Orders;* being distinguished by the names of *Doric, Ionic,* and *Corinthian;* they exhibit three distinct characters of composition, supposed to have been suggested by the diversity of character in the

human frame. The remaining two, being of Italian origin, are called Latin or Roman *Orders;* they are distinguished by the names of *Tuscan* and *Roman,* and were probably invented with a view of extending the characteristic bounds, on one side towards strength and simplicity, as on the other, towards elegance and profusion of enrichments.

At what periods the *Orders* were invented, or by whom their improvement was advanced, we can now only conjecture from the structures and fragments of antiquity, built in different ages, and still remaining to be seen in various parts of Europe, Asia, and Africa. Of their origin, little is known but from the relation of Vitruvius, the veracity of which has been much questioned, and it is probably not altogether to be depended upon.

Of the two Latin *Orders,* the Tuscan is said to have been invented by the inhabitants of Tuscany, before the Romans had intercourse with the Greeks, or were acquainted with their arts and sciences. Probably, however, these people, originally a colony of Greeks, only imitated, in the best manner they could, what they remembered of the state of building, as it existed in their own country, simplifying the Doric, either to expedite their work; or, perhaps to adapt it to the abilities of their workmen.

The second Latin Order, though of Roman production, is but of modern adoption; the ancients never having considered it as a distinct *Order.* It is a mixture of the Ionic and Corinthian, and is now distinguished by the names of *Roman* or *Composite.*

The ingenuity of man has, hitherto, not been able to produce a *Sixth Order,* though large premiums have been offered, and numerous attempts have been made, by means of first-rate talents to accomplish it. Such is the fettered state of human imagination, such the scanty store of its ideas, that Doric, Ionic, and Corinthian, have ever been uppermost; and all that has yet been produced amounts to nothing more than different arrangements and combinations of their parts, with some trifling deviations scarcely deserving notice; the whole generally tending more to diminish than to increase the beauties of the ancient orders.

The suppression of parts of the ancient orders, with a view to produce novelty, has, of late years, been much practised among us, but with very little success. And, though it is not wished to restrain sallies of imagination, nor to discourage genius from attempting invention; yet it is apprehended that attempts to alter the primary forms invented by the ancients, and established by the concurring approbation of many ages, must ever be attended with injurious consequences, always difficult, and seldom or never successful. It is like coining words, which, whatever may be their value, are at first but ill received, and must have the sanction of time to secure them a current reception.

An ORDER is composed of two principal members, the *Column* and the *Entablature;* each of which is divided into three principal parts. Those of the COLUMN are the *Base,* the *Shaft,* and the *Capital;* those of the ENTABLATURE, are the *Architrave,* the *Frieze,* and the *Cornice:* all these again are sub-divided into many smaller parts, the disposition, number, forms, and dimensions, of which characterize each order, and express the degree of strength or delicacy, richness

or simplicity, peculiar to it. Columns of the Five Orders, with their respective names, are represented in *Plates* II. and III.

The simplest and most solid of these orders is the Tuscan Order. It is composed of few and large parts, devoid of ornaments, and is of a construction so massive, that it seems capable of supporting the heaviest burdens; whence it is, by Sir Henry Wotton, compared to a sturdy labourer dressed in homely apparel.*

The Doric Order, next in strength to the Tuscan, and of a grave, robust, or masculine, aspect, is by Scamozzi called the *Herculean.* Being the most antient of all the orders, it retains more of the primitive hut style in its form than any of the rest, having trigliphs in the frieze, to represent the ends of joists, and mutules in its cornice, to represent rafters, with inclined soffits, to express their direction in the originals, from which they were imitated. The Doric columns are often seen in antient works, executed without bases, in imitation of trees; and, in the primitive buildings, without any plinths to raise them above the ground. Freart de Cambrai,† in speaking of this order, observes, that delicate ornaments are repugnant to its characteristic solidity, and that it succeeds best in the simple regularity of its proportions: "Nosegays and garlands of flowers," says he, "grace not a Hercules, who always appears more becomingly with a rough club and lion's skin; for there are beauties of various sorts, and often so dissimilar in their natures, that those which may be highly proper on one occasion, may be quite the reverse, even ridiculously absurd, in others."

The Ionic, being the second of the Grecian orders, holds a middle station between the other two, and stands in equipoise between the grave solidity of the Doric, and the elegant delicacy of the Corinthian. Among the antiques, however, we find it in different dresses; sometimes plentifully adorned, and inclining most towards the Corinthian; sometimes more simple, and bordering on Doric plainness; all according to the fancy of the architect, or nature of the structure where employed. It is throughout of a more slender constructure than either of the afore-described orders; its appearance, though simple, is graceful and majestic; its ornaments should be few, rather neat than luxuriant; and, as there ought to be nothing exaggerated, or affectedly striking in any of its parts, it is not unaptly compared, by Sir Henry Wotton,‡ to a sedate matron, rather in decent than magnificent attire.

"The Corinthian Order," says Sir Henry Wotton, "is a column lasciviously or extravagantly decked, like a wanton courtezan or woman of fashion. Its proportions are elegant in the extreme; every part of the order is divided into a great variety of members, and abundantly enriched with a diversity of ornaments."

"The antients," says De Cambrai, "aiming at the representation of a feminine beauty,

* Vide Sir H. Wotton's *Elements of Architecture.*

† Freart de Cambrai was a learned architect of the seventeenth century, who died in 1676. He was employed by Louis XIII. to collect antiquities, and engage the ablest artists to reside in France.

‡ Vide Sir H. Wotton's *Elements of Architecture.*

omitted nothing either calculated to embellish, or capable of perfecting, their work;" and he observes, "that, in the many examples left of the *Order*, such a profusion of different ornaments is introduced, that they seem to have exhausted imagination in the contrivance of decorations for this masterpiece of the art. Scamozzi calls it the *Virginal*, and it certainly has all the delicacy in its form, with all the gaiety, gaudiness. and affectation in its dress, peculiar to young women."*

The Composite Order is, properly speaking, only a different species of Corinthian, and distinguished from it merely by some peculiarities in the capital, and other trifling deviations.

To produce the most striking idea of their different properties, and to render the comparison between the Orders more easy, they are all represented of the same height; hence the gradual increase of delicacy and richness is at once perceivable, as will be likewise the relations between the intercolumniations of the different orders, when proportioned to their respective pedestals, imposts, archivolts, and other parts, with which they are, on various occasions, accompanied.

The proportions of the Orders were, by the antients, formed on those of the human body; and, consequently, it could not be the intention to make a Corinthian column, which, as Vitruvius observes,† is to represent the delicacy of a young girl, as thick and much taller than a Doric one, which is designed to represent the bulk and vigour of a muscular full-grown man. Columns so formed could not be applied to accompany each other, without violating the laws both of real and apparent solidity; as, in such case, the Doric dwarf must be crushed under the superior Ionic, or the gigantic Corinthian proudly triumphant, and at once reversing the natural and necessary predominance of composition.

Nevertheless, Vignola, Palladio, Scamozzi, Blondel, Perrault, and many others, if not all the great modern architects, have considered them in this light; that is, have made the diameters of all their orders the same; and, consequently, their heights increasing; which, besides giving a wrong idea of the character of these different compositions, has laid a foundation for many erroneous precepts and false reasonings, to be found in different parts of their works.‡

In order to exemplify what has been said, the reader is referred to *Plate* II. of the *Five Orders*, wherein they are represented of the same height; the inspection of which, when duly considered and compared, will, we are convinced, fully satisfy the contemplative reader, that the great authorities referred to were not correct in their notions as to the comparative proportions of the Five Orders, in representing them of different heights, that is, in reference to the doctrine of Vitruvius, who, nevertheless, has scientifically drawn all his inferences as to the

* Scamozzi, an architect of great talent, was born 1550, and succeeded Palladio in his chief employments at Vicenza, in Italy. *Palladio* was born in 1518; died in 1580, and was buried as shown in the next page.

† *Vitruvius*, born at Formio, in Italy, was favoured by Julius Cæsar, and employed by Augustus, the succeeding emperor, in constructing public buildings and machinery. His Treatise on Architecture is well known.

‡ *Vignola* was born in 1507; died in 1573. He succeeded Michael Angelo as architect at St. Peter's, in Rome.

Blondel was a French architect, and an author of great eminence.

Perrault was also a French architect; he was born at Paris, 1613; died 1688. He was the greatest architect France ever produced.

general proportions of the orders from the human figure, which, though not in exact accordance with any known problems, may be easily traced in the study and construction of the human frame; wherein the most sublime definitions in the art of building are assimilated, and may thus be understood, without entering into intricate calculations, founded upon false principles of reasoning.

The learned editor of the late edition of Chambers' *Civil Architecture* observes, and with great truth, "That, to Palladio's birth and existence our country is especially indebted for its progress in architecture, and for the formation of a school which has done it honour, and given it a character of the first class, in the opinion of its continental neighbours." Among the names which that school enrols are those of Inigo Jones, Sir Christopher Wren, Colin Campbell, Nicholas Hawksmoor, Sir John Vanburgh, James Gibbs, Lord Burlington, Kent, Carr of York, Sir Robert Taylor, Sir William Chambers, James Wyatt, and a long list of others, whose works reflect a lustre on the name of PALLADIO, which all the new churches and Grecian profiles of this age will never eclipse.

"Palladio," says the same learned writer, "at the age of sixty-two years, was snatched away from this world. His funeral was attended by all the Olympic Academicians of Vicenza, and his remains deposited in the church of Santa Corona, in that city. His figure was rather small, his countenance remarkably mild and benign, and the height of his forehead reminds us of our immortal Shakspeare. Palladio's demeanor and conduct was modest and obliging, and the esteem in which he was held, on these accounts, by all with whom he had business, is the strongest proof of the truth given of him by those who have written the history of his life, and have enumerated his various public works: and, from what has been stated, Palladio, in this country, may be considered the grand-sire of our art; and, as long as good taste prevails, his name will ever be revered, notwithstanding the pains which have been taken, by the enthusiastic admirers of Grecian architecture, to suppress the Roman style of building, as adopted by him, and which, by men of the most profound judgment, has been considered the best calculated to illustrate the most sublime, as well as the most tasteful, compositions. The detail of Grecian architecture is beautiful, and cannot fail to be admired by the lovers of the science; but, when compared in the aggregate, as regards its application to general compositions, it is inferior to the Roman style, inasmuch as its general proportions are too severe, and the parts too heavy to be amalgamated in varied compositions, upon an extended scale, where *novelty* is required. Let it, however, be understood, that we are great admirers of Grecian architecture; at the same time, we feel it incumbent to direct the student to the consideration of Roman principles, and to guard him, if possible, against the prevailing effects of prejudice.

CHAPTER I.

PROPORTIONS OF THE ORDERS.

In the opinion of Scamozzi, columns should not be less than seven of their diameters in height, nor more than ten; the former being, according to him, a good proportion in the Tuscan, and the latter in the Corinthian, order. The practise of the antients in their best works being conformable to this precept, we have, as authorised by the doctrine of Vitruvius, made the Tuscan *seven* diameters, and the Doric *eight;* the Ionic *nine,* as Palladio and Vignola have done; and the Corinthian and Composite *ten;* which last is a mean between the proportions observed in the Pantheon, at Rome, and at the three columns in the Campo Vaccino, both which are esteemed most excellent models of the Corinthian order.

The height of the entablatures, in all the orders, are made one quarter of the height of the Column; which was the common practice of the antients, who, in all sorts of entablatures, seldom exceeded or fell short of that measure.

Nevertheless, Palladio, Scamozzi, Alberti, Barbaro, Cataneo, Delorme, and others of the modern architects,* have made their entablatures much lower in the Ionic, Composite, and Corinthian, orders, than in the Tuscan or Doric. This, on some occasions, may not only be excusable, but highly proper; particularly where the intercolumniations are wide, as in a second or third order, in private houses, or inside decorations, where lightness should be preferred to dignity; and where expense, with every impediment to the conveniency of the fabric, are carefully to be avoided; but to set aside a proportion which seems to have had the general approbation of the antient architects, is surely presuming too far.

The reason alleged in favour of this practice is the weakness of the columns in the delicate orders, which renders them unfit for supporting heavy burdens; and where the intervals are fixed, as in a second order; or, in other places, where wide intercolumniations are either necessary, or not to be avoided, the reason is certainly sufficient; but, if the architect be at liberty to dispose his columns at pleasure, the simplest and the most natural way of conquering the difficulty is, to employ more columns, by placing them nearer to each other, as was the custom of the antients. And it must be remembered that, though the height of the entablature in a delicate order is made the same as in a massive one, yet it will not, either in reality or in appearance, be

* *Leoni Baptista Alberti* was an Italian architect, of great eminence, who died in 1485.

Barbaro, born in 1513, and died in 1570, was an architect of much learning; he was ambassador from Venice to England, and left in 1551.

Cataneo was an Italian architect; he wrote a Commentary on Vitruvius.

Delorme was a French architect, born at Lyons, in the sixteenth century; he was the restorer of architecture in France.

equally heavy; for the quantity of matter in the Corinthian cornice A, is considerably less than in the Tuscan cornice B,* and the increased number of parts composing the former will, of course, make it appear far lighter than the latter.

With regard to the parts of the entablature, we have followed the method of Serlio,† in his Ionic and Corinthian orders; and of Perrault, who, in all his orders, except the Doric, divides the whole height of the entablature into ten equal parts, three of which he gives to the architrave, three to the frieze, and four to the cornice; and in the Doric *order*, he divides the whole height of the entablature into eight parts, of which two are given to the architrave, three to the frieze, and three to the cornice.

These measures deviate very little from those observed in the greatest number of antiques now extant at Rome, where they have stood the test of many ages, and their simplicity renders them singularly useful in composition, as they are easily remembered and easily applied.

Of two modes, used by antient and modern architects, to determine the dimensions of the mouldings, and the lesser parts that compose an order, we have chosen the simplest, readiest, and most accurate; which is, by the *Module,* or semi-diameter of the column, taken at the bottom of the shaft, and divided into thirty minutes.

There are, indeed, many who prefer the method of measuring by equal parts, imagining beauty to depend on the simplicity and accuracy of the relations existing between the whole body and its members, and alleging that dimensions, which have evident affinities, are better remembered than those whose relations are too complicated to be immediately apprehended.

With regard to the former of these suppositions, it is evidently false; for the real relations subsisting between dissimilar figures, have not any connexion with the apparent ones; and, with regard to the latter, it may or may not be the case, according to the degree of accuracy with which the partition is made: for instance, in dividing the attic base, which may be numbered among the simplest compositions in architecture, according to the different methods, it appears as easy to recollect the numbers 10, $7\frac{1}{2}$, 1, $4\frac{1}{4}$, 1, $5\frac{1}{4}$, as to remember that the entire height of the base is to be divided into three equal parts; that two of these three are to be divided into four; that three of the four are to be divided into two; and that one of the two is to be divided into six, of which one is to be divided into three.

But, admitting that it were easier to remember the one than the other, it does not seem necessary, nor even advisable, in a science where a vast diversity of knowledge is required, to burden the memory with a thousand trifling dimensions. If the general proportions be known, it is all that is requisite in composing; and, when a design is to be executed, it is easy to have recourse to figured drawings, or to prints. The use of the module is universal, throughout the orders and all their appurtenances; it marks their relation to each other; and being susceptible of the

* See the *plate*, No. 2, of *Orders*, all shewn of the same height.

† *Serlio* was a Bolognese, a disciple of Perriozzi, and was the first architect who measured and published the remains of Roman architecture: he died in the service of Francis I, 1552.

minutest divisions, the dimensions may be speedily determined with the utmost accuracy; while the trouble, confusion, uncertainty, and loss of time, in measuring by equal parts, are very considerable, seeing it is necessary to form almost as many different scales as there are different parts to be divided.

Columns, in imitation of trees, from which they derive their origin, are tapered in the shafts. In the specimens of antiquity, the diminution is variously performed: sometimes beginning from the foot of the shaft, at others from one-quarter, or one-third, of its height; the lower part being left perfectly cylindrical. The former of these methods was most in use amongst the antients, and being the most natural, seems to claim the preference, though the latter has been almost universally practised by modern architects, from a supposition, perhaps, of its being more graceful, as it is more marked and strikingly perceptible.

" The first architects," says Monsieur Auzott, " probably made their columns in straight lines, in imitation of trees, so that their shaft was the frustum of the cone; but, finding this form abrupt and disagreeable, they made use of some curve, which, springing from the extremities of the superior and inferior diameters of the column swelled beyond the sides of the cone, and thus gave the most pleasing figure to the outline. Vitruvius, in the second chapter of his third book, mentions this practice; but in so obscure and cursory a manner, that his meaning has not been clearly understood; and several of the modern architects, intending to conform themselves to his doctrine, have made the diameters of their columns greater in the middle than at the foot of the shaft. Leoni Baptista Alberti,* with several of the Florentine and Roman architects, carried this practice to a very absurd excess, for which they have been justly blamed, it being neither natural, reasonable, nor beautiful."

Sir Henry Wotton, in his *Elements of Architecture*, says, in his usual quaint style, " And here I must take leave to blame a practice *growne* (I know not how) in *certaine* places too familiar of making *pillars* swell in the middle, as if they were *sicke* of some *tympany* or *dropsie*, without any *authentique* pattern or rule to my knowledge, and unseemly to the very judgement and sight."

And Monsieur Auzott further observes, " that a column, supposing its shaft to be the frustum of a cone, may have an additional thickness in the middle without being swelled in that part, beyond the bulk of its inferior parts, and supposes the addition, mentioned by Vitruvius, to signify not any thing more than the increase towards the middle of the column, occasioned by changing the straight line, which at first was in use, into a curve, and, by dexterous means, to ' snatch a grace beyond the reach of art.' "

The supposition of Auzott is extremely just, and founded on what is observable in the works of antiquity, where there is not any single instance of a column thicker in the middle than at the

* " This classical author, Alberti, divides the height of the column into seven parts, and places the greatest swelling at the height of the third division of these parts from the base; so that he assumes the doctrine of Vitruvius by the strict letter, conceiving his meaning to be that the swelling is very near the middle of the height of the column."

bottom, though all, or most of them, have the swelling hinted at by Vitruvius, all of them being terminated by curves; some few granite columns excepted, which are bounded by straight lines; a proof, perhaps, of their antiquity, or of their having been wrought in the quarries of Egypt by unskilful workmen.

Blondel, an eminent French architect already noticed, in a work written by him, and entitled "*Resolution des quatre principaux Problêms d'Architecture*," teaches various modes of diminishing columns; the best and simplest of which is by means of the instrument invented by *Nicomedes*, to describe the first conchoid: for this, being applied to the bottom of the shaft, performs, at one sweep, both the swelling and the diminution; giving such a graceful form to the column, that it is universally allowed to be the most perfect practice hitherto discovered. The columns in the Pantheon, at Rome, accounted the most beautiful among the antiques, are traced in this manner, as appears by the exact measures of one of them, to be found in Desgotez's Antiquities of Rome.*

To give a clear idea of the operation, it will be necessary first to describe Vignola's diminution, on which it is grounded. "As to this second method," says Vignola, "it is a discovery of my own; and, although it is less known than the former, it will be easily comprehended by the figure."†

Having, therefore, determined the measure of your column, *pl.* I. *fig.* 1, (that is to say, the height of the shaft, and its inferior and superior diameters,) draw a line, indefinitely, from C through D, perpendicular to the axis of the column: this done, set off the distance CD, which is the inferior semi-diameter from A, the extreme point of the superior semi-diameter, to B, a point in the axis. Then, from A, through B, draw the line ABE, which will cut the indefinite line CD in E; and from this point of intersection, E, draw, through the axis of the column, any number of rays, as E*ba*, on each of which, from the axis towards the circumference, setting off the interval CD, you may form any number of points *a*, *a*, *a*, through which, if a curve be drawn, it will describe the swelling and diminution of the column, and produce the most graceful contour.

This method has been considered sufficiently accurate for practice, and especially if a considerable number of points be found; yet, strictly speaking, it is defective; as the curve must either be drawn by hand, or by applying a flexible rule to all the points; both of which are liable to variations. Blondel, therefore, to obviate this objection, (after having proved the curve, passing from A to C, through the points *aa*, to be of the same nature with the first conchoid of the antients,) employed the instrument of Nicomedes to describe it, the construction of which is as follows:—

Having determined, as above, the length of the shaft, with the inferior and superior diameters

* *Desgotez* was a French architect of considerable research, and his works are highly esteemed. The student is cautioned against Marshall's translation: the latter was published in London, 1771, the original in Paris, in 1682.

† Vide *Plate* I, of *Orders*, in which the instrument invented by Nicomedes is fully described: and likewise the manner of drawing the several legitimate mouldings adverted to, as appertaining to the Theory and Practice of the Five Orders.

of the column; and having, likewise, found the length of the line CDE, take three rules, either of wood or metal, as FG, ID, and AH; of which let FG and ID be fastened together at right angles, in G. Cut a dovetail groove in the middle of FG, from top to bottom; and at the point E, on the rule ID, (whose distance from the middle of the groove in FG is the same as that of the point of intersection from the axis of the column,) fix a pin; then, in the rule AH, set off the distance AB equal to CD, the inferior semi-diameter of the column: and, at the point B, fix a button, whose head must be exactly fitted to the grove made in FG, in which it is to slide; and, at the other extremity of the rule AH, cut a slit or channel, HEK, whose length must not be less than the difference of length between EB and ED, and whose breadth must be sufficient to admit the pin fixed at E, which must pass through the slit, that the rule may slide thereon.

The instrument being thus completed, if the middle groove in the rule FG be placed exactly over the axis of the column, it is evident that the rule AH, in moving along the groove, will, with its extremity A, describe A, *a*, *a*, C; which curve is the same as that produced by Vignola's method of diminution, supposing it done with the utmost accuracy; for the interval AB, *a b*, is always the same, and the point E is the origin of an infinity of lines, of which the points BA, *ba*, *ba*, extending from the axis to the circumference, are equal to each other and to DC. And, if the rules be of an indefinite size, and the pins at E and B be made to move along their respective rules, so that the intervals, AB and DE, may be augmented or diminished at pleasure; it is likewise evident that the same instrument may be thus applied to columns of any size.

In the remains of antiquity, the quantity of diminution at the upper diameter of columns is various; but seldom less than one-eighth of the inferior diameter of the column, nor more than one-sixth of it. The last of these is, by Vitruvius, esteemed the most perfect, and Vignola has employed it in four of his orders, as we have in all of them; there being no reason for diminishing the Tuscan column more, in proportion to its diameter, than any of the rest; though it be the doctrine of Vitruvius, and the practice of Palladio, Vignola, Scamozzi, and almost all the modern architects. On the contrary, as Monsieur Perrault justly observes, its diminution ought to be rather less than more; as it actually is in the Trajan column, at Rome, being there only one-ninth of the diameter. For, even where the same proportion is observed through all the orders, the absolute quantity of the diminution in the Tuscan Order, supposing the columns of the same height, exceeds that in the Corinthian in the ratio of ten to seven; and if, according to the common practice, the Tuscan Column be less by one quarter at the top than at its foot, the difference between the diminution in the Tuscan and in the Corinthian columns will be as fifteen to seven; and in the Tuscan and Doric nearly as fifteen to nine: so that, notwithstanding there is a considerable difference between the lower diameters of a Tuscan and of a Doric column, both being of the same height, yet their diameters at the top will be nearly equal; and, consequently, the Tuscan will not, in reality, be any stronger than the Doric one; which is contrary to the character of the order.

Vitruvius, in his third book, chapter the third, allots different degrees of diminution to columns of various heights; giving to those of fifteen feet one-sixth of their diameter; to such as are from twenty to thirty feet, one-seventh; and when they are from forty to fifty feet high, one-eighth only: observing that, as the eye is easily deceived in viewing distant objects, which always appear less than they really are, it is necessary to remedy the deception by an increase of the dimensions; otherwise the work will appear ill-constructed and disagreeable to the eye.

Most of the modern architects have taught the same doctrine: but Perrault, in his notes, both on this passage, and on the second chapter of the sixth book, endeavours to prove the absurdity thereof. In fact, it is, on most occasions, if not on all, an evident error; which Vitruvius and his followers have probably been led into, through neglect of combining circumstances. For, if the validity of Perrault's arguments be not assented to, and it is required to judge according to the rigour of optical laws, it must be remembered, that the proper point of view for a column of fifty feet high, is not the same as for one of fifteen: but, on the contrary, more distant, in the same proportion as the column is higher: and that, consequently, the apparent relation between the lower and upper diameters of the column will be the same, whatever be its size. For if we suppose (*pl.* I. *fig.* 2) A to be a point of view, whose respective distance from each of the columns, *fg*, FG, is equal to the respective heights of each, the triangles *f* A *g*, FAG, will be similar; and A*f*, or A *h*, which is the same, will be to A*g*, as AF, or its equal AH, is to AG: therefore if *de* be in reality to *bc*, as DE is to BC, it will likewise be apparently so; for the angle *d*A*c* will then be to the angle *b*A*c*, as the angle DAE is to the angle BAC; and if the real relations differ, the apparent ones will also differ.

The eye of the spectator is supposed to be in a line perpendicular to the foot of the shaft; but if the columns be proportionately raised to any height above the eye, the argument will remain in force, as the point in view must of course be proportionately more distant; and even when columns are placed immediately on the ground, which seldom or ever is the case, the alteration occasioned by that situation is too trifling to deserve notice.

When, therefore, a certain degree of diminution, which, by experience, is found pleasing, has been fixed upon, there will not be any necessity for changing it, whatever be the height of the column, provided the point of view is not limited; but, in those places where the spectator is not at liberty to choose a proper distance for his point of sight, which must be almost invariably the case in viewing the public buildings of the metropolis, the architect, if he inclines to be scrupulously accurate, may take the liberty to vary the diminutions according to the situation. But, in reality, it is not a matter of any great importance; as, in all probability, the nearness of the object will render the image thereof indistinct; and, consequently, any small alteration imperceptible.

Scammozzi, who esteems it an essential property of the delicate order to exceed the massy ones in height, has applied the above cited precept of Vitruvius to the different orders: having diminished the Tuscan column one quarter of its diameter; the Doric one-fifth; the Ionic one-

sixth; the Roman or Composite one-seventh; and, the Corinthian one-eighth. In the preceding part of these definitions upon the subject, the fallacy of Vitruvius' ideas has been shown upon principles which cannot be set aside, that is, with respect to the heights of his orders, and where the error of reducing the Tuscan column more than any of the others has been proved, and which diminution is illustrated by the foregoing arguments: so that it is needless to say any thing further on the subject now; for, as the case is similar, the same reasoning may be employed in continuation.

The intention being to give an exact idea of the orders of the antients, they are represented under such figures and proportions as appear to have been most in use in the esteemed works of the Romans and Grecians, who, in the opinions of the most eminent writers, carried architecture to the highest degree of perfection. It must, not, however, be imagined that the same general proportions will, on all occasions, succeed. Those which we prefer have been collected chiefly from the temples and other public structures of antiquity, and may be employed in churches, palaces, and other buildings of magnificence, where majesty and grandeur of manner should be extended to their utmost limits. Where the whole composition is generally large, the parts require an extraordinary degree of boldness, to make them distinctly perceptible from the proper general points of view: but, in less considerable edifices, and under various circumstances, of which details will hereafter be given, more suitable, and perhaps more elegant, proportions may often be designed by the ingenuity of man.

An ORDER of ARCHITECTURE, as before observed, consists of two grand parts, the *Column* and the *Entablature*. The COLUMN comprises the *Base, Shaft,* and *Capital;* and the ENTABLATURE, the *Architrave, Frieze,* and *Cornice;* each of which parts must be divided, subdivided, and arranged, as hereinafter described, by the several figured engravings, which will teach the reader not only how to draw but to construct the several orders upon the most correct principles.

DEFINITIONS, &c.

IF A CIRCULAR COLUMN has no base, it is called a *frustum column;* but, if it has one, the shaft, base, and capital, altogether, form the *Column*, and the mass supported by the column, is denominated the *Entablature.*

The beam, which is presumed to rest upon the column, and forms the lowest part of the entabl ture, is called the ARCHITRAVE, or *Epistylium.*

The space comprehended between the upper side of the architrave or epistylium, and the under side of the presumed beam over the joists, is called the FRIEZE or *Frize,* or *Zophorus.*

The profile, or edge of the presumed inclined roof, upheld by the joists, or cross beams, projecting beyond the face of the frieze or zophorus. is called the CORNICE.

The thickest or lowest part of the column is called the *lower diameter;* and the slenderest or uppermost part of the column is called the *upper diameter.*

Half the lower diameter is called a *Module,* which, being divided into thirty equal parts, these are called *Minutes;* by this scale every part appertaining to the order is regulated, both as regards the altitude and projection of the several component parts, each of which are minutely represented in the particular engravings of the Five Orders hereafter.

The depth of the column, from the lowest part of the architrave to the upper diameter, or slenderest part of the column, is called the CAPITAL.

The space comprehended between the upper diameter, or slenderest part of the column, and the lower diameter, or thickest part of the same, is called the SHAFT: and the space, if any, between the pedestal, or step, is called the BASE; but if without any, of course the column must then rest upon the step, as in the Grecian, Doric, &c.

The smallest spaces between the lower diameters of columns, standing in the same range, are called INTERCOLUMNIATIONS.

When intercolumniations are one diameter and a half of the lower diameters of columns, they are called *pycnostyle,* or columns set thickly.

When the intercolumniations are two diameters of the lower diameters, they are called *systyle.*

When the intercolumniations are two and one quarter of the lower diameters, they are called *eustyle.*

When the intercolumniations are three diameters of the lower diameters, they are called *decastyle.*

When the intercolumniations are four diameters of the lower diameters of columns, they are called *æosystyle,* or columns set thinly; in which case they may be coupled, in the manner of the portico in the west front of St. Paul's, London, and many other grand edifices.

When porticos consist of four columns, with three intercolumniations, they are called *tetrastyle;* with six columns, *hexastyle;* with eight columns, *octastyle:* and, in like manner, according to the number of columns, they are identified by Latin terms, which may be created *ad infinitum.*

Porticos to public buildings, with six, eight, or ten, columns, are the most esteemed; yet, among the antient buildings, beautiful examples, with four columns only, are frequent; as, for instance, the much admired Doric portico at Athens, and the Ionic specimen on the river Ilissus, and many others executed under the direction of Grecian and Roman architects; the details of which cannot fail to be duly appreciated.

CHAPTER II.

MOULDINGS, ORNAMENTS, DETAILS, &c.

A LITTLE digression here may be useful to the practical student; to whom we earnestly recommend a second perusal of the observations and directions contained in the preceding chapter; and, subsequently, to copy the engravings, making his drawings, double, treble, or quadruple, the sizes of the originals, by which means he will presently acquire a thorough acquaintance with the different parts of the orders; and, by degrees, will be able to compose, design, and execute, architectural subjects, with ease and comfort to himself, and satisfaction to his employers.

Having explained the more general, we shall now proceed to illustrate all the detailed, parts of the different orders, with their properties, application and enrichments, as regards the theory of MOULDINGS.

As in all other arts, so in architecture, there are certain elementary forms, which, though simple in their nature, and few in number, are the principal constituent objects of every composition; however complicated or extensive it may be.

Of these there are, in this science, two distinct sorts; the first consisting of such parts as represent those that were essentially necessary in the construction of the primitive huts, as the shaft of the column, with the plinth of its base, and the abacus of its capital; representing upright trees, with the stones used to raise and to cover them, likewise the architrave and trigliph, representing the beams and joists; the mutules, modillions, and dentils, either representing the rafters, or some other pieces of timber employed to support the covering: and the corona, representing the beds of materials which composed the covering itself. All these are properly distinguished by the appellation of *essential parts*, and form the first class. The subservient members, contrived for the use and ornament of these, and intended either to support, to shelter, or to unite them gracefully together, which are usually called MOULDINGS, constitute the second class.

The *essential* parts were, most probably, the only ones employed, even in the first stone buildings; as may be collected from some ancient specimens yet remaining: for the architects of those early times, had certainly very imperfect ideas of beauty in the productions of art, and therefore contented themselves with barely imitating the rude model before them: but at length comparing the works of their own hands with animal and vegetable productions, each species of which is composed of a great diversity of forms, affording an inexhaustible fund of amusement to the mind, they could not but conceive a disgust at the frequent repetition of square figures in their buildings, and therefore thought of introducing certain intermediate parts, which might seem to

be of some use, and, at the same time, be so formed, as to give a more varied and pleasing appearance to the whole composition; and this, in all probability, was the origin of mouldings.

Of REGULAR MOULDINGS there are but eight; the names of which are, the *Ovolo*, the *Talon*, the *Cyma*, the *Cavetto*, the *Torus*, the *Astragal*, the *Scotia*, and the *Fillet*, which are shown by various figures in *Plate* I.

The names of these are allusive to their forms; and their forms are adapted to the uses which they are intended to serve. The *Ovolo* and *Talon*, being strong at their extremities, are fit for supports. The *Cyma* and *Cavetto*, though improper for that purpose, as they are weak in the extreme parts, and terminate in a point, are well contrived for coverings to shelter other members: the tendency of their outline being very opposite to the direction of falling water, which, for that reason, cannot glide along their surface, but must necessarily drop from it. The *Torus* and *Astragal*, shaped like ropes, are intended to bind and strengthen the parts on which they are employed; and the use of the *Fillet* and *Scotia* is only to separate, contrast, and strengthen, the effect of other mouldings; to give a graceful turn to the profile, and to prevent that confusion which would be occasioned by joining several convex members together.

That the inventors of these forms meant to express something by these different figures, will scarcely be denied; and that the above-mentioned were their destinations, may be deduced not only from their figures, but from the practice of the ancients in their most esteemed works: for, if we examine the Pantheon, the three columns of Campo Vaccino, the Temple of Jupiter Tonans, the fragments of the Frontispiece of Nero, the Basilica of Antonius, the Forum of Nerva, the Arches of Titus and Septimus Severus, the Theatre of Marcellus, and almost every ancient building, either at Rome, or in other parts of Italy, France, or elsewhere, it will be found, that, in all their profiles, the *Cyma* and the *Cavetto* are constantly used as finishings, and never applied where strength is required: that the *Ovolo* and *Talon* are always employed as supporters to the essential members of the composition, such as the modillions, dentils, and coronas.

The chief use of the *Torus* and *Astragal* is, to fortify the tops and bottoms of columns, and sometimes of pedestals, where they are frequently cut in the form of ropes: as in the Trajan column, in the Temple of Concord, and in several fragments which are to be seen at Rome, and in other ancient edifices, at places where architecture has been most encouraged.

The *Scotia* is employed only to separate the members of bases, for which purpose the *Fillet* is likewise used, not only in bases, but in all kinds of profiles.*

Mr. Gwilt, a modern author, very justly observes, although it is not mentioned in Chambers, that the *Ovolo* should be used only above the level of the eye of the spectator; that the *Cavetto* ought not to be seen in bases or capitals; that the *Cyma-recta* ought to be used only in crowning members; the *Scotia* below the eye; and the *Fillet* when required to separate the curved parts.

The same author furthermore appositely remarks that, in these days, all sense in the

* For the History of Mouldings, and their origin, *vide* Evelyn's Account of Architects and Architecture.

application of appropriate forms in mouldings seems extinct, and Palladio set at defiance. In addition, he states that, the artist or artisan who can now produce the newest and most extraordinary moulding in projecting an order, is considered as the greatest genius. These observations are founded in truth

Without paying any attention to the *whims* of the day, it may be safely infered, as Chambers remarks, that there is something positive and natural in the *primary* forms of architecture ; and consequently, in the subordinate parts : and that Palladio erred in employing the Cavetto under the Corona, in three of his orders, and in making such frequent use, through all his profiles, of the Cyma, as a supporting member. Nor has Vignola been more judicious in finishing his Tuscan cornice with an Ovolo ; a moulding extremely improper for that purpose, and productive of a very disagreeable effect : for it gives a mutilated air to the entire of the profile, so much the more striking as it resembles exactly that half of the Ionic cornice, which is under the Corona. Other architects have been guilty of similar improprieties, and are therefore equally blameable.

Various are the MODES of DESCRIBING the CONTOUR OR OUTLINE of ROMAN MOULDINGS ; the simplest, however, and the best, is to form them of quadrants of circles, as shown in the first plate of *Orders*, by which means the different depressions and swellings will be more strongly marked ; the transitions should be made without any angles, and the projections be agreeable to the doctrines of Vitruvius and the practice of the ancients ; those of the Ovolo, Talon, Cyma, and Cavetto, being each equal to their height ; that of the Scotia to one-third, and those of the curved parts of the Torus or Astragal to one-half of their heights.

On particular occasions, however, it may sometimes be necessary to increase, and at other times to diminish, these projections, according to the situation or other circumstances attending the profile ; and where it so happens, the Ovolo, Talon, Cyma, and Cavetto, may be either described from the summits of equilateral triangles, or be composed of the quadrants of the ellipses, in the Grecian manner ; of which the latter should be preferred, as it produces a stronger contrast of light and shade, and therefore marks the forms more distinctly.

The Scotia may be likewise framed of elliptical portions, or quadrants, of the circle, varying more or less from each other ; by which mean, its projection may be either increased or diminished : but the curved part of the Torus or Astragal should be semi-circular, in imitation of the Roman manner, and the increase in the projection be made by straight lines : but when in imitation of the superior Grecian style of moulding, the upper part of the Torus should be flatter than the lower, and be regulated according to the altitude of the mouldings from the ground : the pleasing effects of this method of profiling is observable in the contour of all the Torus mouldings in the Bank of England, where the ingenious architect has very judiciously introduced, as the prevailing order of the exterior, one of the best specimens of Roman art, of the Corinthian order, in the adoption of the beautiful example taken from the Temple of Vesta, at Tivoli ; in which instance, the mouldings, meaning those of the Bank, altogether participate in the Grecian character, and we have been induced particularly to notice that magnificent building as a striking

proof of the good taste of the Professor of Architecture at the Royal Academy, whose classic feeling for the association of Roman and Grecian architecture is every where manifested in the well-arranged building adverted to; that is, where the original style of the architecture has been metamorphosed.

The Ovolo, adopted by the Grecian architects, differs widely from the Roman specimen; its contour, in most cases, is a part of the ellipsis; in some instances it is hyperbolic; and, in some examples, it approximates to a straight line.

In Grecian architecture, the Elliptical Ovolo, or Echinus, is introduced into cornices, architraves, and also into the capitals of the Ionic and Doric orders; in the latter of which it forms a very conspicuous feature. The Ovolo, or Echinus, in the capitals of the Doric portico at Athens, the temple of Corinth, and those of Pæstum in Italy, are each of them elliptical; the hyperbolic form is also prevalent, and frequently to be met with in Athenian buildings, particularly in the Temples of Minerva and Theseus, and likewise in the capitals of the columns of the *Propylea*, the magnificent entrance to the citadel of Athens. The buildings last adverted to were erected during the administration of Pericles, 444 to 429 B.C. In the capitals of the columns, in the portico of Philip, king of Macedon, the echinus is a straight line, as well as in other ancient buildings; examples and profiles of which are given throughout this work for the instruction of the practical builder.

In the Roman architecture, the Ovolo, or echinus, is invariably some portion of a circle; seldom or ever exceeding the quantity of degrees contained in the quadrant, but very frequently less. The hollow or Cavetto moulding is very frequently met with in Roman buildings, but it is not a favorite moulding, nor do we find many specimens of it in the remains of Grecian architecture. In the latter, we find the Doric Cymatium under the fillet of a finishing or crown moulding; but in Roman specimens, few, if any, examples can be produced.

The Cyma-recta, in Grecian and Roman architecture, is very nearly of the same shape and character, and is likewise applied for similar purposes. The Cyma-reversa, in Grecian and Roman architecture, likewise approximate each other in degrees of similitude, and in one of the best specimens of Roman buildings it is applied under the fillets of the crown mouldings of cornices; but, in Grecian buildings, we do not remember any example, except in the portico of Philip, king of Macedon, to which the reader is referred, in the series of engraved Grecian profiles, to be seen in various architectural works.

The quirk, or bending inwards, of the uppermost edge of the Grecian ovolo or echinus, produces, when the sun shines on its surface, the most beautiful variety of light and shade; this relieves it considerably from the adjoining plain surface; and, if entirely obscured in shadow, it will borrow a reflected light, and the quirking or turning inward at the top will also occasion a large portion of shade, which likewise, under peculiar circumstances, is calculated to produce the most pleasing effect.

In the Roman echinus or ovolo, there is not any quirk at the top; and the consequence is,

when the sun shines on its surface, it does not appear so interesting on its upper edge, as the Grecian echinus; nor will it produce such a beautiful line of distinction in connection with mouldings which are combined, that is, when under shadow or lighted by reflection.

In the Grecian Cyma-reversa, the quirk, or turning in of its upper edge, and the turning out or bending of the under edge, will be most advantageously seen when the sun shines remarkably bright on those edges; which will, in a great measure, relieve it from the surrounding perpendicular surfaces, when adjoining to or combined together; and when under shadow, and lighted by reflection, the inclination of the superior and inferior edges will likewise produce the strongest line of distinction on each of the edges; that is, between it and the other mouldings.

Now let us examine the difference in effect between the Grecian example and the Roman, and it will be presently seen how much superior the Grecian style of moulding is over that of the Roman. The superior and inferior edges of the Roman Cyma-reversa, being perpendicular to the horizon, the place lightest on the surface will not be a single degree lighter, nor will it be, in the remotest manner, better relieved under shadow than perpendicular surfaces exhibited under the same circumstances. By a comparative view, therefore, of the most scientific principle of composing mouldings, it is manifest that the Grecian Architects were better skilled in designing the minutiæ and detail of architecture than those of the Roman school; the practical student will therefore act wisely by studying the beautiful contour of the Grecian mouldings, as well as the ornaments adapted to them; taking care to avoid, where it is consistent, the stringy or *liney* effect of the ornaments peculiar to the Grecian specimens. The Romans, in designing their foliage, as by reference to the best examples may be seen, exceeded the former in luxuriance of fancy and richness of style; but, in purity and correctness of taste, they were inferior in the composition of ornaments suited to the various mouldings which constitute the component parts of the most ancient orders.

Taking, therefore, into consideration the beauties of Grecian and Roman ornaments, we are of opinion that the student should carefully copy, draw, and examine, the ornaments of each style; and thus he will, if industrious, be able in the course of time to discriminate, and to extract, with truth, taste, and judgment, the beauties of Roman and Grecian ornaments; and, consequently, form a style peculiar to himself. The man who condescends to be a slavish copyist, on all occasions, is unworthy of the honourable appellation of an architect.

It has been stated that Michael Angelo, the greatest architect, painter, and sculptor, of his time, once observed, that he who followed another was sure to be behind. Let every student, therefore, soar as high as his competitor; and, by degrees, he will arrive at excellence, and obtain the meed due to his labour: the wreath of honest fame which cannot be purchased by the riches of Mexico or Peru.

An assemblage of essential parts and mouldings, is termed a PROFILE; and on the choice. disposition, and proportions, of these depend the beauty or deformity of the composition. The most perfect profiles are such as consist of few mouldings: varied, both in form and size; fitly

applied, with regard to their uses; and so distributed that the straight and curved ones succeed each other alternately. In every profile there should be a predominant member, to which all the others ought to appear subservient, and made either to support or to fortify it, or to shelter it from injuries of weather: and, wherever the profile is considerable, or much complicated, the predominant member should always be accompanied with one or more other principal members, in form and dimension calculated to attract the eye, create momentary pauses, and assist the perception of the beholder. These predominant and principal members ought always to be of the essential class, and generally rectangular. Thus, in a cornice, the corona predominates; the modillions and dentils are principals in the composition; the cyma and cavetto cover them; the ovolo and talon support them.

When ornaments are employed to decorate profiles, some of the mouldings should always be left plain, in order to form a proper repose: for when all are enriched, the figure of the profile is lost in confusion. In the cornices of the entablatures, the corona should not be ornamented, nor the modillion-bands, nor the other different fascias of the architraves: neither should the plinths of columns, fillets, nor scarcely any square member, be carved. For, generally speaking, they are either principal in compositions, or applied as boundaries to other parts; in each of which instances their figures should be simple, distinct, and unembarrassed. The dentil-bands should remain uncut, where the ovolo and talon immediately above and below it are enriched; as in the Corinthian cornice of the Pantheon, at Rome; and also in our magnificent Cathedral of Saint Paul, in the City of London. For where the dentils are marked, especially if they are minute, as in Palladio's Corinthian design, the three members are confounded together; and, being surcharged with ornaments, they become by far too rich for the residue of the composition, which are defects at all times studiously to be avoided; as a distinct outline, and an equal distribution of enrichments, must, on every occasion, strictly be attended to.

Scamozzi, who succeeded Palladio in all his chief employments at Vicenza, observes, with great truth, that ornaments should neither be too frugally employed, nor distributed with too much profusion; their value will increase in proportion to the judgment and discretion shown in their application. For, in effect, says he, the ornaments of sculpture, used in architecture, are like diamonds in a female dress, with which it would be absurd to cover the face or other principal parts, either in themselves beautiful, or appearing with greater propriety in their natural state.

Variety in ornaments ought not to be carried to an excess. In architecture they are only accessaries, and therefore they should not be too striking, nor capable of long detaining the attention from the main object. Those of the mouldings, in particular, should be simple, uniform, nor ever composed of more than two different representations upon each moulding: these ought to be cut equally deep, be formed of the same number of parts, and all nearly of the same dimensions, in order to produce an even, calm, and uninterrupted, effect throughout: so that the eye may not be more strongly attracted by any particular part than by the entire composition.

When mouldings are of the same form and size in a profile, they should be enriched with ornaments of one kind; hence the figure of the profile will be better comprehended, and the architect will avoid the imputation of childish minuteness, neither much to his own credit, nor of any advantage to his works.

It must be remarked, that, all manner of ornaments appertaining to mouldings should be evenly and regularly disposed, corresponding perpendicularly above each other, as at the three columns in the Campo Vaccino, where the middles of the modillions, dentils, oves, or eggs, and other ornaments, are all in one perpendicular line. For nothing can be more careless, confused, and unsightly than to divide them without any order, as they are in many examples of the ancients, and in many buildings in London, where the middle of an ove, or egg, answers, in some instances, to the edge of the dentil, and in some to its middle, and in others to the interval. All the rest of the ornaments in the cornices of entablatures should be governed by the modillions, or mutules; and the distribution of these must depend on the intervals of the columns: and be so disposed that one of them may come directly over the centre of each of the columns.

It is further to be remarked, that the ornaments should partake of the character of the order they enrich. Those applied to the Doric and Ionic order should be of the simplest forms, and of larger sizes, than those employed in the Corinthian and Composite.

When friezes or other large compartments are required to be enriched, the ornaments should be appropriate and significant, and serve to indicate the use for which the building is intended, the rank, qualities, profession, as well as the achievements, of the proprietor: but it is a very silly practice to crowd almost every part with heraldic arms, crests, cyphers, and mottos: insignificant figures of such things are for the most part not only contemptible, but, generally speaking, very bad, or extremely vulgar; and their introduction betrays an unbecoming vanity in the proprietor of the fabric. Hogarth, says Chambers, pleasantly ridiculed this practice by decorating a nobleman's crutch with a coronet.

In sacred places, all manner of obscene, grotesque, and heathenish, representations ought to be avoided: for indecent fables, extravagant conceits, or instruments and symbols of Pagan worship, are ornaments grossly improper in structures consecrated to Christian devotion.

With regard to the execution of ornaments, it is to be remembered that, as in sculpture, drapery is not esteemed, unless its folds are contrived to grace and indicate the parts and gesticulations of the body it covers; so in architecture, the most delicate and classical ornaments lose all their value if they load, alter, or confuse, the forms they are intended to enrich and adorn.

All manner of ornaments, therefore, which appertain to mouldings, except such as are cast, should be cut into the solid, and never applied on the surfuce, as Davilier, a late architect, has most erroneously taught; because the latter method not only alters, but disfigures, the forms and proportions of the mouldings. The profiles, therefore, should be first finished plain, and afterwards enriched; the most prominent parts of the ornaments being made equal with the surfaces of the mouldings they adorn: and great care should be taken, in all such cases, that the angles,

or breaks, are kept perfect and untouched with sculpture; and from this reason it is usual, at the angles of all manner of enriched mouldings, to place water-leaves or other plain leaves, the centre filaments of which form the angles, and keep the outlines entire.

One of the most delightful examples in verification of the before-mentioned principle, says Mr. Gwilt, is the capital of the order, used in the circular temple at Tivoli, in which the leaves, instead of being *aplique* to the bell of the capital, are absolutely cut out of it: the effect of which, says the same author, "*is wonderful as well as pleasing.*" We have been favoured with an exact copy of the capital adverted to, as measured by an artist upon the spot, and have great pleasure in presenting it to our readers, who may rely upon it as a correct representation, it being copied from an original, which has been subsequently introduced in the exterior elevation of the Bank of England, by the classical architect of that national and splendid structure.

The method of the ancient sculptors, in the execution of architectonic ornaments, was to aim at a perfect representation of the object they chose to imitate; so that the chestnuts, acorns, and oves, or eggs, with which the ovolo is commonly enriched, are in the ancient as well as in modern examples, cut round and almost entirely detached; as are, likewise, the berries, or beads, on the astragal, which are generally as much hollowed into the solid of the bodies as the mouldings which project beyond them; but the leaves, shells, and flowers, which are usually introduced to decorate the cavetto, cyma, talon, and torus, are kept flat, in imitation of the things which they represent.

The ancients, in the application of their ornaments, were very choice in the selection of such as required considerable relief. On mouldings, that in themselves are clumsy, such as the ovolo and astragal, they made deep incisions to produce their enrichments, by which they acquired an extraordinary lightness: but, on more elegant parts, such as the cavetto and cyma, they employed the representation of very thin bodies, such as leaves, which could be represented without entering too far into the solid. The ornaments in the cornices of the ancients were boldly marked, that they might be distinguished from afar; but those of the bases of columns, or of pedestals, being nearer the eye, were more slightly expressed; as well on that account, as because it would have been very improper to weaken those parts, and utterly impossible to keep them clean, had there been any deep cavities in them to harbour dust and filth.

When objects are very near, and liable to close inspection, every part of the ornaments, both great and small, should be forcibly expressed and well finished: but, when they are much elevated, the minutiæ or detail may be slightly touched only, or entirely neglected; for it is quite sufficient if the general form be distinct, and the principal or more prominent masses strongly marked. A few rough strokes, from the hand of a skilful master, are much more effectual than the most elaborate finishings of a cold and artless imitator, which seldom consists of more than smoothing and neatly rounding-off the parts, and are more calculated to destroy, than to produce, effect.

Nature is the supreme and true model of the imitative arts; from a contemplation of her beau-

ties every great artist must form his idea of the profession in which he means, and is determined, to excel: the works of the ancients are, to the architect, what nature is to the painter or sculptor; the source from which his chief knowledge must be collected; the models by which his taste must be formed. But, even in nature, few things are faultless, and it must not be imagined that every ancient production in architecture, though Grecian or Roman, is perfect and fit for imitation. On the contrary, the remains of the ancients are so extremely unequal, that it requires the greatest discrimination, circumspection, and effort of judgment to make a proper choice. The Grecian and Roman arts, like those of other nations, have had their rise, their æra of perfection, their decline. At Athens, at Rome, as in London and Paris, and elsewhere, there have been but very few great architects, but many very indifferent ones; and the Romans and Grecians had their connoisseurs, as we have ours, who would sometimes dictate to the architect and cramp the fortunate sallies of his genius; force upon him, and upon the world, their own whimsical productions; promote ignorant flatterers; discourage, and even oppress, honest merit.

Vitruvius, who lived in the Augustan age, complains loudly of this hardship: and there is a remarkable instance of the vindictive spirit of an ancient connoisseur in Adrian, who put to death the celebrated Apollodorus, for having ventured a sarcastic remark upon a temple designed by that emperor, and built under his direction.

In the constructive part of architecture, the ancients do not seem to have been great proficients; and we are inclined to believe, with the most learned authors, that many of the deformities observable in the Grecian buildings must be ascribed to their deficiency in the art of construction. Neither does it appear that the Romans were much more skilful: the precepts by Vitruvius are very imperfect and ambiguous upon the subject, and sometimes extremely erroneous; and it is highly probable that the strength or duration of their structures is more owing to the quantity and goodness of their materials, than to any scientific principle of putting them together: we must not, therefore, expect from any of the ancient works much information on the executive branch of the art.

Michael Angelo, who, skilled as he was in mathematical knowledge, could have no very high opinion of the ancient mode of construction, boasted that he would suspend the largest temple of antiquity, meaning the Pantheon, in the air; this he afterwards verified in the cupola of Saint Peter's, at Rome: and Sir Christopher Wren, with not less ability, conducted all the parts of Saint Paul's, and many other of his numerous and admirable works, with so much ingenuity and art, that they are, and ever will be, studied and admired by all intelligent observers. To him, and several eminent artists and artificers since his time, we owe many great improvements in the art of building, which has been, in late years, still further improved by the labours of Mr. Peter Nicholson, and other ingenious and practical men, upon whose scientific principles the British nation has established, and carried to the highest perfection, every thing which is interesting, instructive, and useful, in the arts of carpentry and joinery, masonry, bricklaying, ornamental plastering, &c.; and which the gentlemen engaged in the execution of this volume, and the two

preceding ones, have endeavoured to display and illustrate, in the hope of rendering a benefit, not only to the young architect in particular, but to the public in general.

Some of the French architects have also evinced considerable science in the constructive art; in the mason's particularly, which has been considerably improved by that nation; and we are likewise indebted to the French, to the Italians, and to a few of our own countrymen, for many valuable books, in which the manner of conducting great works is copiously explained.

From such works, composed on a principle similar to that now under perusal, the architect may collect the rudiments of construction; but, it is to be remembered that practice, experience, and attentive observation, are essentially requisite to render him properly skilled in this important branch of his profession.

REFERENCES TO THE PLATES ON THE PRECEDING THEORY OF THE FIVE ORDERS.

Orders, Plate I.—*Fig.* 1 represents two methods, in a joint diagram, of producing graceful or pleasing contours to the shafts of columns, by Vignola and Nicomedes, which are fully described in reference to this plate in the body of the work.

Fig. 2 elucidates also, by an optical diagram, the theory on the diminution of columns, likewise adverted to, subsequent to the former, in the letter-press.

Figures 3, 4, 5, 6, 7, 8, 9, and 10, represent the different Roman mouldings, used in the combination of bases, capitals, and entablatures, with the method of drawing them, and the names attached to each.

Fig. 11 represents the outline of the Doric order, with lettered references to the respective mouldings, so that the student may refer to the names of each, and thus become familiar with the science.

Fig. 12 exhibits the entablature and capital of the Grecian Doric order, as built in the Temple of Theseus, at Athens, showing the trigliphs at the angles, and the architrave overhanging the upper diameter of the column.

Orders, Plate II. represents the five ancient orders of Roman architecture; elucidating, at one view, their general proportions, with their names, and graduated according to their rank, as they should be carried into effect, that is, in proportion to their bulk, and in reference also to the preceding theory and subsequent principles on practice.

Orders, Plate III.—This plate represents the three Grecian orders, known by the names of Doric, Ionic, and Corinthian, which are introduced for the purpose of elucidating the difference in the style of the Roman and Grecian architects, in the carrying these orders into effect.

We now proceed to the Practice of the Five Orders, commencing with the Tuscan.

CHAPTER III.

PRACTICE OF THE TUSCAN ORDER.

Among the remains of antiquity, there are not any of a regular *Tuscan Order*, but a most admirable specimen of a Tuscan column exists in the Trajan pillar, at Rome. The doctrine of Vitruvius upon the subject of the Tuscan order is extremely obscure, and the profiles of Palladio's disciples are all more or less imperfect.

In the design here introduced, (*Plate* IV.) Vignola has been imitated. Even Inigo Jones, who was so close an adherer to Palladio, has employed Vignola's profile in York Stairs, London, and in other designs of public and private edifices. But as the cornice adopted by Inigo Jones appears to have been, in the opinion of the best writers, inferior to the rest of his Tuscan compositions, it has been rejected, and the profile of Scamozzi, introduced, with such alterations as have been considered necessary to render it perfect, and conformable to the doctrine of Vitruvius, as well as to the general practice of the moderns.

The height given to the column is fourteen modules, or seven diameters; and to that of the entire entablature, three and a half modules; which being divided into ten equal parts, three of them are given to the height of the architrave, three to the frieze, and the remaining four to the cornice.

The capital is in height one module; the base, including the lower cincture of the shaft, is also one module; and the shaft, with its upper cincture, twelve modules.

These are the general measures of the Tuscan order, and may be easily remembered.

With regard to the particular dimensions of the minuter parts, they may be collected from the engraving, *Orders, Plate* IV, whereon the heights and projections of each member are minutely figured, the latter of these being counted from perpendiculars raised at the extremities of the inferior and superior diameters of the shaft: a method which has been deemed universally preferable to that of Desgotez, and others, who count from the centre of the column, because the relations between the heights and projections of the parts are more readily discoverable; and, wherever a cornice or entablature is to be executed without a column, which very frequently happens, it does not require any additional time or labour, as the trouble of deducting, from each dimension, the semi-diameter of the column, is saved.

Scamozzi, that his bases might be of the same height in all the orders, has given to the Tuscan, exclusive of the cincture, half a diameter: but, in the example here introduced from Chambers, Vignola and Palládio have been imitated. The latter, in this order, have deviated from the general rule; for, as the Tuscan base is composed of two members only, instead of six, which consti-

tute the other bases, it becomes much too clumsy when the same general proportion is scrupulously followed.

The Tuscan order will not admit of ornaments of any kind; on the contrary, it is sometimes customary to represent, in the shaft of its column, rustic cinctures, as at the Luxembourg, in Paris; at York-Stairs and Somerset-House, in London; and in many other buildings of considerable note. This practice, though frequent, and to be found in many of the works of distinguished architects, is not always excusable, and should be indulged with great caution, as it helps to hide the robust characteristic and truly rustic but manly figure of the column, it alters the proportions, and at once affects the simplicity of the entire composition. Few examples are to be found of these bandages in the remains of antiquity; and, in general, it will be adviseable to avoid them in all large designs; reserving the rustic work for the intercolumniations, where it may be employed with great propriety so as to produce a contrast, which will help to render the aspect of the entire composition perfect, distinct, and striking.

But in smaller works, where the parts are few, and easily comprehended, rustic cinctures may be sometimes introduced and sanctioned, and oftentimes recommended; as they serve to diversify the forms, produce strong and impressive contrasts, and contribute most essentially to the masculine, bold, and imposing, effect of the composition.

The most eminent of the ancient, as well as modern, architects have recommended the Tuscan order to be introduced in the exterior gateways to citadels, arsenals, and prisons, of which the entrances should be terrific; and the order is also fit for designs of gates to gardens or parks, and for grottos, fountains, and baths, where elegance of form and delicacy of workmanship would be inconsistent and out of character. Delorme, the French architect, was extremely fond of cinctures, which are square blocks, introduced at intervals in the heights of the shafts of columns, and he employed them in several parts of the Thuilleries, covered with arms, cyphers, and other enrichments: but this seems very absurd, for they never can be considered in any other light than as parts, which, to avoid expense and trouble, were left unfinished. In different parts of the Louvre, wormy or vermiculated rustics are to be found, of which the tracts represent flowers de luce, and other regular figures and devices; this is a practice far more unnatural than the preceding, though Monsieur Davalier states that it may be done with great propriety, and signify a relation to the owner of the structure; that is, says he, the figures should represent the arms, the crest, motto, cypher, and all the rest; as if worms were draughtsmen, and understood whatever appertained to heraldry.*

The most beautiful specimen of the Tuscan order, in London, is the portico of St. Paul's Church, Covent-Garden; the effect of which is truly sublime: it was designed by, and executed

* Davalier was born in 1653; died in 1700. He was a native of Paris, was elected by the French Academy one of their travelling students at an early age, and took his departure from Marseilles with Desgotez and the celebrated Vaillant. The ship in which they sailed was captured by the Corsairs, and carried into Algiers. His captivity lasted seventeen months, during which time he designed and executed a mosque, at Tunis, for the Barbarians. Besides the work above-mentioned, he translated Scamozzi.

under the inspection of, Inigo Jones,* who frankly told the parishioners, previous to the commencement of the undertaking, that their funds were not equal to the expenses of building a magnificent parish church, but that he would design and execute, for the same purpose, the handsomest *barn* in his Majesty's dominions, which was presently verified; and perhaps, in the metropolis, we have not a more harmoniously proportioned room, nor one better calculated for divine service: that is, with regard to hearing and seeing the officiating minister; and with respect to the exterior effect, it cannot be equalled for its simplicity and grandeur.

The various designs, for gates, doors, and windows, which have been published by the most distinguished architects, afford numerous figures of rustic columns, and other sorts of rustic work; most of which have been collected from buildings of considerable note in different parts of Europe; but for the manner of executing them, as it cannot well be described, the student is referred to various parts of the new buildings at Somerset-House, in the Strand, to the Horse-Guards, the Treasury, the gate of Burlington-House in Piccadilly, the fronts of Newgate and Giltspur Street Prisons, the Excise-Office in Broad Street, and to numerous other buildings in and near the metropolis.

Sir William Chambers says, that De Cambrai, in the introduction to his "*Parallels of Ancient and Modern Architecture,*" treats the Tuscan order with great contempt, and banishes it to the country, as unfit and unworthy to have a place, either in temples or palaces; but, in the second part of the same work, he is more kind and indulgent; for, though he rejects the entablature, the

* This justly celebrated English architect was the son of Ignatius Jones, cloth-worker, and was born in the vicinity of Saint Paul's, about 1572. He is said to have been apprenticed to a carpenter and joiner, but that he remained long in such fetters is not probable, from the circumstance of his early skill in landscape painting, of which a specimen is, we believe, still to be seen in Chiswick-House. Under the patronage either of the Earl of Arundel or the Earl of Pembroke, he visited Italy, and spent much of his time in Venice. From Venice he passed into Denmark, on the invitation of Christian IV. In 1606 he returned to his native country, in the suite of the King of Denmark, whose sister James the First had married. Mr. Seward observes, that the first of his works in England was the interior of the church of Saint Catherine Cree, in Leadenhall Street. Soon after his arrival he was appointed architect to the queen, and was also in the service of prince Henry: to these he gave so much satisfaction, that the king granted him the reversion of surveyor-general. On the death of Prince Henry, in 1612, Jones visited Italy a second time, where he remained until the office just mentioned fell to him. His liberality and disinterestedness on this occasion deserve to be recorded. Finding the office greatly in debt, he not only served without pay till the embarrassments were removed, but prevailed upon his fellow officers to do the like, by which expedient the debt was soon cleared. He wrote by the desire of the king, an account of Stonehenge, in 1620, in which year he was appointed one of the commissioners for repairing *old* St. Paul's Cathedral, in London. On the death of James, he was continued in his situation by Charles I., for whom he executed the banqueting house, barely the fiftieth part of the then proposed palace at Whitehall, the designs for which had been made in the previous reign. In June, 1633, the order was issued for the reparation of St. Paul's, on which Jones was immediately afterwards employed. During the reign of Charles I, he gave many proofs of his genius and fancy, in the machinery and designs for scenic representations, &c. He died in 1652, and was interred in the chancel of St. Bennet's, Paul's Wharf, London. His works are too well known to require an enumeration. It is here sufficient to say that he was the FATHER of PURE ARCHITECTURE in GREAT BRITAIN. Representations of many of his buildings may be seen in Campbell's "*Vitruvius Britannicus.*" His principal designs were published by Kent, folio, 1727; some of his lesser designs, folio, 1744; and others were also published by Mr. Ware. The Water-front of Old Somerset-House has lately been copied in the erection of a very conspicuous Fire-Office, near the Quadrant, in the new street of the metropolis; the adoption of which is a strong proof of the architect's good sense and discrimination. Inigo Jones left a copy of Palladio, the Venice edition of 1601, with notes on the margin, in his own hand-writing: he seems to have carried this copy about with him on his travels, from the notes being dated. The book, says Mr. Gwilt, which has been badly preserved, is in the library of Worcester College, Oxford, where it may still be seen.

column is taken into favour, "and compared to a queen seated on a throne, surrounded with all the treasures of fame, and distributing honours to her minions, while other columns seem only to be servants and slaves of the buildings they support."

The residue of the passage is too long to be inserted, but it is calculated to degrade, and totally to exclude, the Tuscan order: yet, by a different mode of employing and dressing the *column*, to exalt its consequence, and increase its majesty and beauty, so as to stand an advantageous comparison with any of the rest; he, therefore, wishes, in imitation of ancient architects, to consecrate the Tuscan column to the commemoration of great men and their glorious actions; noticing, as we have done, the Trajan column, one of the proudest monuments of Roman splendour, and consisting of the base, shaft, and capital, of the Tuscan order. This column was erected by the senate and people of Rome, in ackowledgment of the services of Trajan, and has contributed more to immortalize that emperor than the united efforts of all historians.

De Cambrai also notices the Antonine column, erected at Rome, on a similar occasion, in honour of *Antonius Pius;* and another, of the same sort, at Constantinople, raised to the emperor Theodosius, after his victory over the Scythians: both which prove, by their resemblance to the Trajan column, that this sort of appropriation, recommended by him, had passed into a rule among the ancient masters of the art.

We shall not here dispute the accuracy, justness, or fitness, of De Cambrai's observations; but may venture to affirm that, not only the Tuscan *column*, but the *entire of the order*, as represented in this work, after Sir William Chambers, (which, in fact, is the production of Vignola and Scamozzi,) may be praised and extolled as extremely beautiful; and, in numerous instances, may be usefully applied: besides, as an order, it is a necessary gradation in the art; and, although not recognized by the Grecian architects, for its purposes it is not inferior to any of the ancient orders: for it conveys, not only ideas of strength and rustic simplicity, but is very proper for rural purposes, and may, with great propriety, be employed in farm-houses, in barns, and sheds for implements of husbandry, in stables, coach-houses, dog-kennels, in green-houses, grottos, and fountains; in gates of parks and gardens, and, generally, whenever magnificence is not required and expense is to be avoided. Serlio recommends the use of it in prisons, arsenals, public granaries, treasuries, sea-ports, and gates of fortified places; and Le Clerc observes that, although the Tuscan order is treated by Vitruvius, by Palladio, and by many others, with great contempt, as unworthy of being identified; yet, according to the composition of Vignola, there is a beauty in its simplicity which recommends it to notice, and entitles it to a place both in private and public buildings, as in porticos and colonnades surrounding squares or markets, in granaries and storehouses; even in royal palaces, if suitably introduced to adorn the inferior apartments, offices, stables, and other places, where strength and simplicity are required, and where richer or more delicate orders would be extremely improper.

In accordance with the theory and practice which have been explained, seven diameters, or fourteen modules, have been appropriated to the height of the Tuscan column; a proportion extremely

proper for rural and military works, where the appearance of extraordinary solidity is required: but, in town-houses and other buildings, intended for civil purposes, or in reference to interior decorations, the heights of the columns may be fourteen and a half, or even fifteen, modules, as Scamozzi has made them; which increase may be entirely in the shaft, without altering any of the measures, either of the base or capital. Nor will it be requisite to alter the entablature; for, as it is composed of few parts, it will be sufficiently bold, although its height be somewhat less than one quarter of the height of the column.

REFERENCES TO THE PLATE ON THE PRACTICE OF THE TUSCAN ORDER.

ORDERS, PLATE IV.—*Fig.* 1 represents the entablature and capital, on a large scale, wherein the heights and projections of the several members are proportioned, as described in the theoretical and practical references.

Fig. 2 shews the base, one half of the size of the column annexed.

Fig. 3 describes the proper impost and archivolt to this order, under the idea of their being employed in arcades or gateways, which is very frequently the case.

CHAPTER IV.

PRACTICE OF THE DORIC ORDER.

THE MONUMENT on Fish-Street Hill, erected to commemorate one of the most dire calamities that ever befel the inhabitants of this great city, is considered the proudest example of a Roman Doric column in the British dominions. It was designed and constructed by Sir Christopher Wren. The lower diameter of the column is fifteen feet, and the altitude of the shaft is in proportion: this, with the historical pedestal, and the attic at the top, emblematical of the great fire, is upwards of 200 feet in height.

In order to contemplate the beautiful and philosophical proportions of the Roman Doric *column*, as connected with its *entablature*, which is a component part of the order, it will be requisite that the student should turn his attention and thoughts to those examples which have been designed and executed under the greatest masters, both ancient and modern.

It has been the practice, of late years, to introduce, as a substitute for the Roman Doric and Tuscan pillars, the Grecian Doric column; especially in monuments intended to commemorate the achievements of valorous men; but among those which have been carried into effect, during our time, in various parts of the kingdom, it is but honest to remark, that they are as inferior, in

point of effect, to the Doric Monument in London, as the minor churches of the metropolis are to the sublime cathedral dedicated to Saint Paul.

The Grecian Doric column, elevated upon a pedestal, is entirely at variance with the practice of the Grecian architects; who, in all the Temples of antiquity, have placed their columns upon a series of lofty gradated risers, proportioned or suited to the circumstances of the case: and, where this practice has not been adopted, the Grecian Doric column, which is peculiar for its beauty, and singular in its effect, has been sacrificed for the want of judgment.

The height of the Roman Doric column, including its capital and base, is sixteen modules; and the height of the entablature four modules: the latter, being divided into eight parts, two of these parts are allowed to the architrave, three to the frieze, and the remaining three to the cornice.

In most of the antiques, the Doric column is found to have been executed without a base; this is particularly observable in examining the remains of Grecian examples. Vitruvius, likewise, makes it without one; the base, according to that author, having been first employed in the Ionic order, to imitate the sandal or covering of a woman's foot. Scamozzi blames this practice, and most of the moderns have been of his opinion; the greatest part of them having employed the attic base in this order. Monsieur De Cambrai, however, whose blind attachment to the antique is, on many occasions, sufficiently evident, argues strongly against this practice, under the idea that the order is formed upon the model of a strong man, who is constantly represented barefooted; and, according to the notions of this author, the practice of introducing a base to the Doric column is very improper; and "though," says he, "the custom of employing a base, in contempt of all ancient authority, has by unaccountable and false notions of beauty prevailed," yet we are of opinion, with Chambers, that the intelligent eye, when apprized of the error, will be easily undeceived; and as what is merely plausible will, when examined, appear to be false, so will apparent beauties, when not founded in reason, be deemed extravagant.

Le Clerc says that, in most ancient monuments of this order, the columns are without bases, for which it is difficult to assign any satisfactory reason; but De Cambrai, in his parallel, is of the same opinion with Vitruvius, and insists that the Doric column, being composed upon the model of a naked, strong, and muscular, man, resembling Hercules, should not have any base; thus affecting that the base to a column is the same as a shoe to a man. This doctrine may have prevailed in former times; but, at the present, it is too inconsistent and childish to be adopted: for we cannot consider a column destitute of a base, in comparing it to a man, without being, at the same time, struck with the idea of a person without feet, rather than without shoes: hence we are inclinable to believe, either that the architects of antiquity had not yet thought of employing bases to their columns, or that they omitted them in order to leave the pavement clear; the angles and projections of bases being stumbling blocks to passengers, and so much the more troublesome, as the architects of those times frequently placed their columns very near each other; so that, had they been made with bases, the passages between them would have been extremely

narrow and inconvenient. There can be no doubt that it was from this reason that Vitruvius made the plinth of his Tuscan column round; the latter order being, according to his precepts, especially adapted to servile and commercial purposes, where convenience should always give way to beauty. But, whatever may be the opinion of the vulgar, it is presumed that men of good taste will allow that, in most cases, a well-proportioned graceful base is very handsome; and not only so, but also of real utility, serving to keep the column firm in its place; and that, if columns without bases are entirely set aside, it will be a mark of wisdom in architects rather than an indication of their being swaved bv prejudice, as some blind adorers of the ancients would insinuate.

The latter are the sentiments of Sir William Chambers, who had a rooted aversion to every thing which was Grecian: nevertheless, it must be granted that he was, " take him all in all," a man of considerable judgment, and reasoned well upon his art. In imitation of Palladio, and all the modern architects, except Vignola, he has made use of the attic base in this order; which base certainly is the most beautiful of any. Yet, for the sake of variety, when the Doric and Ionic orders are employed together, the base invented by Vignola should be adopted, as shewn in the Doric Order, *Plate* II. This base Bernini has employed in the colonnade of Saint Peter's, at Rome; and it has been also very successfully applied in many other buildings.

Vitruvius gives to the height of the Doric capital one module; and all the moderns, except Alberti, have followed his example. Nevertheless, as the capital is of the same kind with the Tuscan, they should be nearly of the same proportion, in reference to the heights of their respective columns; and, under these circumstances, the Doric capital should be more than one module; which, indeed, it is, both at the Coliseum and the Theatre of Marcellus, at Rome; being in the first of these buildings upwards of thirty-eight minutes, and in the latter thirty-three minutes, high.

In the design, *Orders, Plate* V, the example adverted to after Sir William Chambers, the height of the entire capital is thirty-two minutes; and, in the form and dimensions of the several members, it seems that he deviated but little from the Theatre of Marcellus at Rome. The frieze or neck of the capital is enriched with husks and roses, as in Palladio's design, and as it has been executed by Sangallo at the Farnese Palace.* The projections of the husks and flowers should not exceed the upper cincture of the column.

The architrave is only one module in height, and is composed of one fascia and a fillet, as the Theatre of Marcellus. The drops in this, the Roman Doric, are conical, as they are in most of the Roman buildings; and not pyramidal, as they are generally executed by our English artisans. They are presumed, says Chambers, to represent drops of water that have trickled from the trigliphs; and, consequently, they should be cones, or parts of cones, and not pyramids;

* Sangallo was one of the architects employed in building St. Peter's, at Rome.

but the Grecian architects, who were better versed in the minutiæ and details of architecture, thought very differently, and made these drops portions of cylinders, the plan being rather more than a semi-circle, and those in the soffits of the mutules perfectly round; and, instead of being inserted in the solid of the mutules, they are described, in the Grecian Doric, as so many pendents; which, in execution and in effect, is infinitely superior to the cold Roman style of finishing the same parts.

The Doric frieze and cornice by Sir William Chambers, as given in this work, are, each of them, one module and a half in height, the metope is square, and enriched with a bull's skull, decorated with garlands of beads, in imitation of those in the Temple of Jupiter Tonans.

In some ancient fragments, and in a large portion of our modern edifices, the metopes between the trigliphs are alternately ornamented with ox-skulls and with patteras; but they may, with great propriety, be filled with any other ornaments of suitable forms, and frequently with such as are appropriated to the buildings they decorate. For example: in military structures, the head of Medusa, or the Furies, thunderbolts, and other symbols of horror, may be correctly introduced: also helmets, daggers, garlands of laurel or oak, and crowns of various sorts, such as those used among the Romans, and presented as rewards for various military achievements: but spears, swords, quivers, bows, cuirasses, shields, and the like, should be avoided; because the actual dimensions of these instruments are too great to find admittance in such limited spaces as the compartments adverted to, and as diminutive representations always convey ideas of triviality, they should, consequently, be wholly avoided. In our churches, dedicated to the saints, and set apart for christian worship, cherubs, chalices, and garlands of palm or olive, may be introduced; likewise doves, and other symbols of moral virtues. In private houses, crests or marks of dignity conferred, may, on some occasions, be permitted; but seldom, and indeed never, where they are of such stiff insipid forms as stars and garters, modern crowns, coronets, mitres, and similar graceless objects, the tasteless effects of which may be seen at the Treasury, in St. James's Park, and on various other buildings in the metropolis.

Among all the entablatures of the Five Orders, the Doric is the most difficult to distribute; that is, on account of the intervals between the centres of the trigliphs, which will not admit of being increased or decreased, without materially injuring the symmetry and characteristic beauty of the composition: and hence it is that the composer must be fettered by intercolumniations, devisable by two modules and a half, or of 250 minutes from centre to centre, which entirely excludes coupled columns, and produces spaces which, in general, are either too wide or too narrow for the purpose; and, to remove these difficulties, the trigliphs have been often omitted, and the entablature made plain, as at the Coliseum in Rome, at the Custom-House in Dublin, and in many other magnificent buildings, not only in this country, but abroad. It is an easy expedient; but at the same time it deprives the order of its principal and primitive characteristic, and leaves it very poor and so much impoverished, as to be very little, if at all, superior to the Tuscan order;

the remedy therefore seems desperate, and ought never to be adopted but in extreme cases, as the very last resource.

Chambers says, that the ancients employed the Doric order in temples dedicated to Minerva, to Mars, and to Hercules, whose grave and manly dispositions suited well with the character of the order: and Serlio says, it is proper for churches dedicated to Christ, to Saint Paul, Saint Peter, or any other saints, remarkable for their fortitude, in exposing their lives and suffering for the Christian faith; and Le Clerc recommends the adoption of it, in all sorts of military buildings, in the entrances to cities, arsenals, gates of fortified places, guard-rooms, and in all manner of similar edifices. It may also be employed in private houses; and, in particular, in the dwelling-houses of generals or other martial men: it may likewise be introduced in mausoleums erected to their memory, or in triumphal bridges and arches built to celebrate their victories.

The height of the Roman Doric Column herein referred to is sixteen modules; which, in buildings where majesty and grandeur is required, is a suitable proportion; but in an infinity of other instances it may be made more delicate. Vitruvius makes the Doric column in porticos loftier by half a diameter than in temples, and many of the modern architects have followed his example. In private houses, therefore, it may be $16\frac{1}{4}$, $16\frac{1}{2}$, or $16\frac{3}{4}$, modules high; and for interior decorations even 17 modules, and sometimes perhaps a little more, which increase in the height may be carried entirely to the shaft, as described in the Tuscan order, without altering, in the smallest degree, either the base or the capital. The entablature may also remain unaltered in all its parts, for what is good in the one case applies to the other.

The Roman Doric Order stands second in the list of the Five Orders; but the Grecian Doric, from which the former emanates, stands first among the three Greek orders, and is the most ancient of those so called in architecture, being evidently derived from the Egyptians, of which little doubt can be entertained by those who have examined that great national work at the British Museum, which was published under the auspices of Buonaparte at the time he was identified as Napoleon le Grande. The Temple of Minerva, at Athens, commonly called the *Parthenon*, is considered, by the most learned architects and philosophers, as the boldest specimen of Grecian architecture that ever was constructed; the style of this structure is now generally known to be what is termed the *Grecian Doric:* but, besides this magnificent temple, the beauties of which have been explored by Stuart and others, there are several temples and buildings of great interest, well worthy the consideration of the architectural student, connoisseur, and draughtsman; particularly the Ionic Temples of Erectheus, Minerva Polias, the small Temple on the river Illissus, the Temple of the Winds, the Choragic Monument of Lysicrates, commonly called the Lantern of Demosthenes, as well as the Choragic Monuments of Trysallus and others; among some of the last-mentioned may be collected almost every thing which is great and good in Grecian architecture.

The numerous examples of Roman and Grecian ornaments, mouldings, bases, capitals, and cornices, given in this work, have been selected as specimens of the pure style; and are, therefore, recommended, with some degree of confidence, to the attentive consideration of our readers

The manner of reducing the Grecian Doric Order to practice, is defined in the representation of the plates; which, we hope, will facilitate the labours of those who are anxious to acquire so much practical information as will enable them to reduce the order to such proportions, as, under all circumstances, will be pleasing and agreeable.

REFERENCES TO THE SEVERAL PLATES EXPLANATORY OF THE DORIC ORDER.

Orders, Plate V.—*Fig.* 1. The *entablature* and *capital* of the *Roman Doric Order*, on a large scale, wherein the heights and projections of the respective members are correctly proportioned by a scale of modules and minutes, as explained in the Theory of the Five Orders, and which method equally applies to the lower and upper diameters of all the Orders.

Fig. 2.—Elevation of half of the attic base, the most esteemed among the ancient examples.

Fig. 3.—Plan of the soffit; exhibiting the various ornaments appropriate to the mutules and spaces between.

Orders, Plate VI.—*Fig.* 1. *Grecian Doric Entablature*, accompanied with an imitation of one of the capitals of the columns in the Temple of Theseus.

Fig. 2.—Plan of the soffit in the last-mentioned entablature, showing the mutules with the bells, or circular drops, appertaining thereto.

Fig. 3.—Plan of the angular trigliphs and the forms of the residue.

Orders, Plate VII.—*Fig.* 1. *Grecian Doric Entablature*, showing part of a pediment imitated from the Temple of Minerva, at Athens; with one of the capitals and bases of the columns appertaining to that magnificent temple. A view of the above entablature and capital is also given, under the article of Perspective, in this work, by M. A. Nicholson.

Fig. 2.—Plan of the soffit, in the above entablature, showing the mutules, with the bells or circular drops.

Orders, Plate VIII.—*Fig.* 1. *Grecian Doric Entablature*, showing the application of the antæ at the angles of buildings.

Fig. 2.—The profile of the foregoing entablature and antæ.

Orders, Plate IX.—*Fig.* 1. *Grecian Entablature*, with antique wreaths; showing, also, the application of the antæ at the angles of buildings, and as executed in the Choragic Monument of Trysallus, at the foot of the Acropolis, or Citadel of Athens.

Fig. 2.—Profiles of the entablature and antæ, both of which are highly esteemed as Grecian examples, for their correct proportions, and decided effects when carried into execution.

CHAPTER V.

PRACTICE OF THE IONIC ORDER.

This order is identified as the third in the list of the five ancient orders of Roman architecture, and is proportioned by Sir William Chambers, as described in *Orders, Plate* II. The Ionic is the second, also, in the list of the three Grecian orders, as described in *Plate* III. It is necessary that the distinction should be made and well known, as there is a difference in the character of the Roman and Grecian Ionic, although both are recognized under the same general name.

The general proportions of the ancient Ionic order, as adopted by the Grecian and Roman architects, are nearly alike; but the minutiæ and detail are very different; which will be presently discovered, by an attentive examination of the subsequent plates.

Among the ancients, says Chambers, who always refers to the Roman architects, the form of the Ionic profile appears to have been more positively determined than that of any other; for, in all the antiques, the Temple of Concord excepted, it is exactly the same, and conformable to the description given by Vitruvius.

In *Plate* X, of *Orders*, is represented the design of the antique profile, collected by Sir William Chambers, from different antiquities at Rome. The height of the column is eighteen modules, and that of the entablature four and a half, or one quarter of the height of the column, as in the other orders; which is a trifle less than in any of the ancient examples. The base is attic, as it is in most of the Roman antiques, and the shaft of the column may be either plain or fluted, with twenty-four or twenty flutings only, as at the Temple of Fortune, the plan of which flutings should be a trifle more than semi-circular, as in the Temple of Jupiter Tonans, and at the Forum of Nerva; because, when so executed, they are then more distinctly marked. The fillets, or intervals between the flutes, should not be much broader than one-third of their widths, nor narrower than one-quarter.

The ornaments of the capital should correspond with the flutes of the shaft, and there should be an ove, or a dart, according to the strict rules of the Romans, over the middle of each flute: but, in the Roman Ionic volute, described in *Plate* XI, we have made some deviations from the general rule, and have introduced the contour and proportions of a Roman Ionic volute, which is considered as an improvement upon Goldman's and Delorme's method of describing the principal characteristic of this order. It is, therefore, deemed unnecessary to enter into further details upon the various opinions of different authors, on a subject which will be best comprehended and felt by a comparative view of the several diagrams for describing volutes.

The Roman volute is by some architects preferred; which will be apparent to the scientific ob-

server on a cursory view of the magnificent street, now leading from Carlton-Terrace up to Portland Place, in London. In the Ionic façade, opposite the same terrace, the volutes of the capitals are Grecian, and are proportioned in the manner of those in the small temple on the River Ilissus, and as described in this work. This capital is justly esteemed; nor can it be sufficiently appreciated by those who entertain a true love for architecture. It is, therefore, surprising that the ingenious architects employed in the new street should, in any part of it, have adopted inferior specimens of the Roman Ionic capitals, as in the quadrangle, opposite the *façade* before-mentioned. In passing up the street, however, towards Portland Place, it is observable that, wherever the Ionic order has been subsequently introduced, improvements have taken place in the adoption and style of the Ionic capitals, except in the *finale* to the street, which presents to the eye of the inquisitive spectator a circular Ionic portico, terminated by a fluted conical spire of the same form; the metaphorical intention of which is not clearly understood, unless it is meant to convey, by a well-proportioned geometric figure, a new species of metaphysics, deducible, but which can be comprehended only by those who are deeply versed in mathematics. The effect of this spire is stated to be sublime; but what is not generally comprehended must be injudiciously applied; and, therefore, we lament that a magnificent street, so justly distinguished for its picturesque and architectural beauties, should be terminated by a conical *finial*, in no respect correspondent with the bold and intelligent metaphors usually applied by the Genius of Architecture.

The three parts of the Ionic entablature, as represented in *Plate* X. of *Orders*, bear the same proportion to each other in this as in the Tuscan order· the frieze is plain, as being the most suitable to the simplicity of the rest of the composition; and the cornice is almost an exact copy from Vignola's design, in which there is a purity of form, a grandeur of style, and close conformity to the most approved specimens of the ancients, not to be equalled in any of the profiles of his competitors.

If it be requisite to reduce the Ionic entablature to two-ninths of the height of the column, which on most occasions is preferable to that of one quarter, especially where the eye has been accustomed to contemplate diminutive objects, it may be easily accomplished by making the module of the entablature less, by one-ninth, than the semi-diameter of the column; afterwards dividing it as usual, and strictly observing the same dimensions as are figured in the engraved plate X. The distribution of the dentil-band will, in such case, answer very nearly in all the regular intercolumniations, and in the extreme angle there will be a dentil, as there is in the best examples of the antique.

In the decorations of the interior of all apartments, where much delicacy is requisite, the height of the entablature may be reduced even to one-fifth of the column, by observing the same method, and making the module only four-fifths of the semi-diameter.

The Antique Ionic Capital, not only in the Grecian but Roman style, differs from all others; inasmuch as the front and side forms are not similar. This particularity occasions great difficulty, whenever breaks are introduced in the entablature, or where the decorations are

continued in flank as well as in front: for, either all the capitals in the returns must have the baluster side outward, or the angular capital will have a different appearance from the rest, neither of which is admissible where good taste prevails.

The architect of the Temple of Fortune, at Rome, as likewise the scientific artist who designed the small temple on the River Ilissus, have each fallen upon expedients which, in some degree, remedy the defect above-mentioned. In each of those buildings, as well as others, the corner capitals have their angular volutes in *oblique* positions, inclining equally to the front and side, and presenting volutes both ways; and, says Chambers, where persons are violently attached to the antique, or furiously bent on rejecting all modern inventions, however beautiful, this is the only way to gratify them; but, when such is not the case, the angular capital invented by Scamozzi, and lately imitated in the circular portico of Langham Chapel, may be introduced; for it must be allowed that the distorted figure of the antique capital, as represented in *Plate* XVIII, of the *Orders*, with one straight volute and the other twisted, is very objectionable, and far from being pleasing to the eye; yet we are of opinion that the Grecian antique volutes, as carved at the East-India House, in Leadenhall-Street, at the Saint Pancras new church, at the College of Surgeons, in Lincoln's-Inn Fields, and in various other public buildings, are worthy of imitation; and therefore we cannot better discharge our duty than by recommending the student first to draw all the specimens given in this work, and as he proceeds, if opportunities permit, to examine the buildings above-mentioned, or such as are of a similar description.

As the Doric order, says Chambers, is particularly affected in churches and temples dedicated to *male saints*, so the Ionic is chiefly used in such as are consecrated to females of the matronal state. It may, likewise, be employed in Courts of Justice, as well as the Roman or Grecian Doric; it may also be introduced in libraries, colleges, seminaries, and other structures having relation to arts or letters, and also in private-houses, and in palaces to adorn the ladies' apartments: and, says Le Clerc, in all places dedicated to peace and tranquillity. The ancients employed it in temples sacred to Luna, to Bacchus, to Diana, or other deities, whose dispositions hold a medium between the severe and the effeminate.

The Grecian Ionic specimens of capitals, cornices, friezes, and architraves, are, generally speaking, better profiled than those of the Romans: the judicious composer should, therefore, contemplate the several parts appertaining to each style; and, by alternately rejecting and adopting, he will, by degrees, improve his taste: but, as regards the bases of the Grecian Ionic order, usually employed in the antique, we cannot recommend them, although most slavishly adopted by many of our modern practitioners. The attic base of the Romans is the best, simplest, and most natural; and, wherever applied, is sure to give satisfaction: it is therefore, recommended to the serious consideration of the student.

REFERENCES TO THE PLATES APPERTAINING TO THE IONIC ORDER, WHICH INCLUDE THE ROMAN AND GRECIAN EXAMPLES.

ORDERS, PLATE X.—*Fig.* 1 represents the entablature and capital of the Roman Ionic order, on a large scale, proportioned by modules and minutes.

Fig. 2 represents the attic base to the same scale.

Fig. 3.—Plan of one quarter of the capital.

Fig. 4.—Profile of the capital.

Fig. 5.—Half the elevation of the barrel.

ORDERS, PLATE XI.—The contour and proportion of a Roman Ionic Volute, with tne appendages; from a description by Mr. R. Elsam, architect, on a large scale.

ORDERS, PLATE XII.—*Fig.* 1. The entablature and capital of the Grecian Ionic Order, in imitation of the Ionic portico to the small temple on the River Ilissus.*

Fig. 2.—Half the base.

Fig. 3.—Half the section of the capital.

Fig. 4.—Altitudinal scale of the base.

ORDERS, PLATE XIII.—Grecian Ionic capital at large, in imitation of the last example, by Mr. R. Elsam.

ORDERS, PLATE XIV.—Grecian Ionic capital at large, in imitation of the example in the Minerva Polias, at Preene, by Mr. R. Elsam.

ORDERS, PLATE XV.—*Fig.* 1. Plan of the Ionic capital from the Temple of Erectheus at Athens.

Fig. 2.—Elevation of the last-mentioned capital.

Fig. 3.—Plan of the Ionic capital, from the Temple of Minerva Polias, at Athens.

Fig. 4.—Elevation of the last-mentioned capital.

Fig. 5.—Diagram, on a large scale, shewing the minutiæ of finding the different centres for striking the two last described volutes; which, by an attentive examination, will teach the inquisitive student every thing which is requisite on the subject.

ORDERS, PLATE XVI.—*Fig.* 1. Flank elevation of half the Ionic capital, as executed in the Temple of Minerva Polias, at Athens.

Fig. 2.—Section of the same, shewing the barrel of the volute.

Fig. 3.—Transverse section of the same capital.

Fig. 4.—Transverse section of the Ionic capital, in the Temple of Erectheus, at Athens.

Fig. 5.—Flank elevation of the same capital.

Fig. 6.—Section of the same, showing the barrel of the volute.

* An interesting view of this capital is given hereafter, under the article of "PERSPECTIVE," from a drawing by Mr. Michael Angelo Nicholson.

Orders, Plate XVII.—*Fig.* 1. Grecian Ionic entablature, appertaining to the Temple of Minerva Polias, at Athens.

Fig. 2.—Base of the columns to the above order.

Fig. 3.—Half the base of the antæ to the same example.

Fig. 4.—Half the capital of the antæ to the same.

Orders, Plate XVIII.—*Fig.* 1. Plan of an angular Grecian Ionic capital, in imitation of those employed in the small temple on the River Ilissus.

Fig. 2.—Flank elevation of the capital.

Fig. 3.—Section of the capital.

Fig. 4.—Section, showing the barrel of the capital.

Orders, Plate XIX.—*Fig.* 1. An antique Grecian Ionic base.

Fig. 2.—An antique Grecian Ionic capital.

Fig. 3.—An antique Grecian Ionic base.

Fig. 4.—An antique Grecian Ionic capital

CHAPTER VI.

PRACTICE OF THE COMPOSITE ORDER.

Correctly speaking, the Grecians and Romans had but three recognized orders; the Composite and Tuscan not having been acknowledged by the ancients: the moderns, however, have ranked the two latter with the three original orders, which are the Doric, Ionic, and Corinthian. It is the practice with most authors to give to the Composite the fifth or last place, as being the last invented; and also from being a compound of all the rest, which, of course, ought to be preceded by those which are the simplest. But Chambers has followed Scammozzi's arrangement; it being the most natural for the orders to succeed each other according to their degrees of strength, and in the progression that ought to be observed, when they are employed together.

Palladio, Scamozzi, Vignola, De Cambrai, Serlio, and Delorme, together with other modern architects, have each followed the bias of their own inclinations in designing the Composite order: fac-similes, or counter-likenesses, are, therefore, seldom to be met with; it is, however, manifest, from an examination of the best works, that the order now under consideration is compounded, chiefly, of the component parts of the Ionic and Corinthian, without possessing the native simplicity and elegance appertaining to the two latter classical orders. The composite is, nevertheless,

an order of considerable merit, which, on many occasions, will claim a decided preference, and cannot fail to be duly appreciated when judiciously introduced.

The modern architects, says Chambers, have varied more in this than in any of the orders; and De Cambrai observes, that, abandoned by their guide, Vitruvius, and left entirely at large, they have all taken different paths, each following the bent of his own particular fancy; and among them, Serlio has been the least successful; having chosen for the model of his entablature that of the fourth order of the Coliseum: a composition too clumsy even for a Tuscan order. Delorme, however, has followed his example, and has mistaken the fourth order of the Coliseum, which is Corinthian, for the Composite; and Palladio, in his profile, has imitated the frontispiece of Nero, and corrected its defects with much judgment. His architrave is also copied from the same building: but he has omitted the beautiful frieze, and has submitted in its place a swelled one, similar to the Basilica of Antonius. His entablature is too low, being only one-fifth of the column; it is also singular that, although he has made the column more slender than in the Corinthian order, yet his entablature is far more heavy; it being composed of fewer and larger parts. His capital and base are imitations from the arch of Titus, the latter of which is designed without a plinth, as it is executed in the Temple of Tivoli, and joined to the cornice of the pedestal, as may be observed by reference to *Orders, Plate* XXII. on which is also represented the capital adverted to, and which has been lately adopted in the hexastyle portico, by Mr. George Smith, in the front of Saint Paul's New School, opposite the east end of the Cathedral; it has been adopted, likewise, at the Bank of England, by Sir John Soane. The capital here noticed is described as Corinthian, but with more correctness, perhaps, it might be termed a Composite capital; from its being a medium between the Corinthian and Composite referred to in Chambers' orders, which have been followed in this work, that is, as regards the Roman principles or style of architecture.

Vignola's composition of this order has nothing remarkable about it. The architrave varies but in a very small degree from the frontispiece of Nero, and the cornice is nearly the same as the Ionic composed by him; the chief difference consisting in the transposing of mouldings and the enlargements of dentils, each of which appear to be alterations much for the worse.

And Scamozzi's entablature is like Palladio's; that is, only one-fifth of the height of the column; and, being much divided, produces a very trifling appearance. The cornice, however, is well composed; and is also, in a great degree, imitated from the third order of the Coliseum. The capital is similar to Palladio's, and the base is attic, enriched with astragals in accordance with the Basilica of Antonius.

The engraved design here referred to, in imitation of Chambers' Composite order, is the invention of that learned architect, who states that he has attempted to avoid the faults, and to unite the perfections, of those before-mentioned; but how far he has succeeded is left to those who have judgment to discriminate. Under any circumstances, however, the student may refer to Palladio, Scamozzi, or Vignola, which has been the practice heretofore.

The height of the column is twenty modules; the entablature five; the base is attic, and its measures are precisely the same as in the Doric and Ionic orders; but, as the module is less, all the parts are of course proportionately delicate. The shaft is enriched with flutings, which may be either to the number of twenty or of twenty-four, similar to the Ionic order; for we cannot see any reason why, in the different orders, their numbers should be either augmented or diminished. The module being less, the flutes will likewise be less, and correspond exactly with the character of the rest of the composition.

The general effect of the capital is very nearly of the same description as those of the moderns; being enriched with leaves, in imitation of the acanthus, as most of the antique capitals of the Composite order are. But, as regards the method of tracing the minutiæ of these capitals, few instructions, it is presumed, will be deemed sufficient; the design having been correctly drawn and figured by a very accurate draftsman.

The curves of the abacus are described from the summits of equilateral triangles; the projections of the volutes are determined by lines drawn from the extremities of the astragals to the extremities of the horns of the abacus; and the projections of the leaves are determined by other lines drawn parallel to those from the fillet under the astragal.

The style and manner, says Chambers, of executing these and other enriched capitals in the metropolis, is, generally speaking, bad; but it is evident that he did not mean, in the aggregate, to accuse our workmen of want of talent or capacity; many of them, says he, cannot be excelled in neatness of execution; and, perhaps, in point of workmanship, they do, for the most part, eclipse those of any other country; but it frequently happens, from the want of liberality in their employers, and, in some degree, perhaps, from the want of thorough skill and facility in designing, that their performances are very insipid, tame, and without effect, and by no means expressive of the taste or intelligence intended to be conveyed in the designs which have been ordered to be carried into execution.

It is, also, to be regretted, that the greatest architects have too much neglected the detail; having directed their attention chiefly to the general disposition of their compositions. This neglect, though authorized by some great men, ought not, by any means, to be imitated. It is not only the province, but the duty, of the architect strictly to attend to the minutest parts, as well as to the most considerable. Where the entire execution of a fabric is left to his direction, the faults that are committed will, of course, be carried to his account; and, therefore, it behoves him to be choice and extremely select in employing the ablest workmen, and to furnish them with all manner of proper models and precise instructions; in which he will at once announce the extent of his capacity, and distinguish himself from the common herd of those who, without the requisite qualifications, arrrogate the title of architects. The most masterly disposition, says Chambers, incorrectly executed, can be considered only as a sketch in painting, or as an excellent piece of music, miserably murdered by village fiddlers, equally destitute of taste and powers of execution.

The Ionic, Composite, and Corinthian, capitals, to be seen in various parts of the new buildings

at Somerset-House, London, were copied by the author last mentioned, from models executed under his directions at Rome, and imitated, both in point of form and manner of workmanship, from the choicest antiques; hence they will serve as guides to those who are anxious to obtain information at the fountain head; and, by a careful examination of them, the student may obtain such information as cannot be conveyed by the most powerful language, or the most intelligent designs.

The entablatures of the Composite order, in *Plates* II. and XX., bear the same proportion to each other as the Ionic and Tuscan orders. The architrave is nearly of the same form with those of Palladio and Vignola. The frieze may be enriched with foliages in imitation of the antique; but the prominent parts should never project more than the uppermost moulding of the architrave under them.

The cornice is imitated from Scamozzi, and differs from the Corinthian only in the modillions, which are square, and composed of two fascias. The soffit of the intervals between the dentils should be hollowed out upwards, behind the little fillet in front, which is the case in most of the antiques; and the incisions produce dark shades, tending to mark the dentils more distinctly. From the same reasons similar methods should also be observed in the Ionic and Corinthian orders. The roses, in the soffit of the corona, should not project beyond the horizontal surface; and care should be taken not to vary them so much as at St. Peter's, of the Vatican, and some modern buildings, because the unity suffers thereby: the modillions or dentils might, with almost as much propriety, be varied. It will, therefore, be proper, in small compositions, to make them all alike, as they are in most of the antiques; to the end that they may not arrest or occupy too much the attention of the spectator, as objects intended for distinct contemplation; but, simply, as parts of the entire. In larger compositions, they may be of two kinds, as in the Long-room of the new Custom-House, in London, designed and carried into effect under the direction of Mr. David Laing, an architect not less eminent for having planned and executed some good and useful structures, than for his excellent treatise on building, contained in his work, entitled "Plans of Buildings, Public and Private."

In the elegant and spacious room just mentioned, the ornaments in the three domical, coved, or vaulted, soffits are of two sorts; but similar in outline and dimensions, which occasions much variety, but without confusion; for the flowers succeed each other so rapidly, and are, from their similitude, so immediately and well comprehended, that the third impression takes place before the first is in any degree removed; so that the same effect is nearly produced by alternate successions of the same objects.

The Romans introduced the Composite order more frequently in their triumphal arches than in any other buildings; meaning, as Serlio supposes, to express their dominion over other nations, the inventors of the orders of which this is composed. It may, says Le Clerc, with singular propriety be used wherever elegance and magnificence are to be united; but, more especially, in buildings designed to commemorate great and signal events, or to celebrate the combined achieve-

ments of conquerors and legislators; and, from these reasons, that the capitals or other ornaments may be composed of emblems and of allegorical representations, in conformity to the customs of the ancients; as appears by numerous fragments of capitals and entire members of architecture scattered about in different parts of Rome, and elsewhere.

The entablature of the Composite order, as introduced in this work, may be reduced to two-ninths of the column; which, to avoid fractions, we will call four modules and one half, by making the module only nine-tenths of the semi-diameter; at the same time observing the same measures as are figured in the design, in which case there will be a dentil in the outward angle similar to the Ionic order. It may also, if required, be reduced to one-fifth, by making the module four-fifths of the semi-diameter: but, in cases where it is requisite to diminish so much, it will be preferable to adopt the Ionic cornice; which, being composed of fewer parts, will retain an air of grandeur without affecting the entire mass.

REFERENCES TO THE PLATE ON THE PRACTICE OF THE COMPOSITE ORDER.

Orders, Plate XX.—*Fig.* 1. Entablature and capital of the Composite order, wherein the heights and projections of the several members are proportioned in the manner already described.

Fig. 2.—The attic base applicable to this order, and similar to the Ionic and Doric in proportions.

Fig. 3.—Shows the Plan of the soffit in the entablature, with the manner of finishing the modillions.

CHAPTER VII.

PRACTICE OF THE CORINTHIAN ORDER.

This order, says Chambers, is suitable and proper for buildings where elegance, gaiety, and magnificence are required. The ancients employed it in temples dedicated to Venus, to Flora, Proserpine, and the nymphs of fountains; and because the flowers, foliage, and volutes, with which it is adorned, seemed well adapted to the delicacy and elegance of such deities. Being the most splendid of the Five Orders, it is also extremely proper for the decorations of palaces. public squares, or galleries and arcades surrounding them; for churches dedicated to the Virgin Mary, or to other virgin saints: and, on account of its rich, gay, and graceful appearance, it may, with singular propriety, be used in theatres, in banqueting-rooms or ball-rooms, and in all places consecrated to festive mirth or convivial recreation.

It is an uncontroverted opinion, that the fragments of the three columns in the Campo Vaccino (the supposed remains of Jupiter Stator) were, when entire, and still are, the most perfect compositions of the Corinthian order among the Roman antiques; and it is also the opinion of the most learned, that the best example of the Corinthian order among the Grecians, is that which is employed in the Choragic monument of Lysicrates, commonly called the Lantern of Demosthenes, and which capital is introduced in this work: but, independent of that relic, various specimens of Grecian Corinthian capitals, as well as columns and bases, may, at proper times, be seen among the Elgin Marbles, at the British Museum, in London, where the industrious, in search of information, will find ample gratification. The study of these choice remains, now the sole property of the nation, will, it is presumed, contribute more to rouse the imagination of architects, sculptors, and painters, than all the books, prints, and drawings, which have been published, printed, and made, for the last hundred years. Let the student, therefore, after having obtained the usual elementary knowledge of architecture, advantageously apply his genius and understanding to the consideration of those rare and invaluable materials, on which are engraven the talent, learning, history, and genius, of the Greeks, in characters which cannot fail deeply to affect and influence his imagination.

The possession of the Elgin collection is a treasure to the lovers of the Fine Arts; nor can the fragments, so judiciously selected, be sufficiently appreciated; for, during the few years in which they have been exposed to public view, they have produced such interesting and visible changes in architecture, sculpture, and painting, as cannot fail to impress every susceptible mind with a feeling of gratitude, for the liberal sum voted in Parliament to purchase some of the most valuable relics of architecture and sculpture in the civilized world.

Palladio, in his fourth book, where he gives the entire profile at large of the three Corinthian columns in the Campo Vaccino, acknowledges that he never had seen any work better executed, or more delicately finished; and, furthermore, that the parts were beautifully formed, well-proportioned, and skilfully combined.* Now, upon an impartial view, with reference to the Grecian and Roman Corinthian capitals, no doubt in the world can be entertained that the Roman Corinthian capital is as much superior to the Grecian as the latter Ionic capital is to the Roman. The absurdity, therefore, of prejudiced minds, in favour of every thing which is Grecian, must be manifest: the Romans excelled in some instances, and the Grecians in others; it is, consequently, the duty of the student to avoid being seduced by, or entirely devoted to, Grecian or Roman principles: in each style there is much to admire and much to condemn. By judicious selections, the man of correct taste, possessing integrity of mind, may evince his judgment by constructing, altering, and changing, without violating the doctrine of good taste.

* To afford the *amateurs* of architecture a full and comprehensive idea of the beauties of the Antique Roman Corinthian capital, we have given an interesting engraved view of one of the most approved, from an intelligent drawing by Mr. M. A. Nicholson, under the article of "PERSPECTIVE," and to which plate the reader is referred, as well as to *Orders Plate* XXI., which represents the Corinthian order in detail, as proportioned by Sir William Chambers.

Vignola's composition of the Corinthian order is uncommonly beautiful, and, without doubt, superior to that of any other master; he having artfully collected all the perfections of the best originals, out of which he formed an entire composition far preferable to any of them.

The design for the Corinthian order given in this work, from Chambers, differs very little from that of Vignola. The column is twenty modules high, and the entablature five, which proportions are a medium between those of the Pantheon, at Rome, and the three columns of the Campo Vaccino. The base of the column may be either attic or Corinthian; each of them are beautiful. Palladio and Scamozzi have employed the attic, enriched with astragals; but so frequent a repetition of the same semi-circular forms in junction, produces but an indifferent effect; as may be observed in the bases of the columns at the parish church of Saint Martin in the Fields, and in several buildings of the metropolis, in which the profiles and forms of Palladio, good, bad, and indifferent, have been indiscriminately employed.

If the entablature is enriched, the shaft of the column should be fluted, provided it is not composed of variegated marble, for a diversity of colours renders even smooth surfaces confused, and ornaments of sculpture serve only to make the confusion greater. The flutings may be filled to one-third of the height with cableings, as in the inside of the Pantheon, at Rome, which strengthen the lower part of the column, and renders it less liable to damage. But, when the columns are not within reach, nor subject to be hurt by passengers, the cables are better omitted, as the general hue of the shaft will then be the same throughout, and appear to be of a piece; but, when parts of the flutes are filled, and the other parts left vacant, it is not the case; for the shaft then appears divided, and is liable to produce a great defect.

The capital is enriched with olive leaves, as are most of the antiques, at Rome, of this order; the acanthus being seldom employed but in the Composite order.

With respect to the manner of tracing and working this capital, the design, with what has been said on the same subject in the Composite order, will serve as a sufficient explanation.

The division of the entablature bear the same relative proportions to each other as in the Tuscan, Ionic, and Composite, orders. The frieze is sometimes enriched with bas-reliefs, as described in Chambers's *Civil Architecture;* but it is more frequently left quite plain. The parts and ornaments in the cornice are all regularly disposed, and perpendicularly over each other. The coffers of the soffit of the cornice are square, and the borders round them equal on all sides, as they are in the arch of Titus, and as Palladio has made them: a precaution neglected by Vignola, notwithstanding his usual regularity.

The ancients, as well as the moderns, have frequently employed the Ionic entablature in the Corinthian order, as appears by many of the buildings: and this is remarkable in the Corinthian portico, erected by Mr. James Gandon, to the entrance to the late House of Lords, in Dublin, now the *approchè* to the Director's Court-Room of the National Bank; and, according to Vitruvius, even the Doric entablature has been employed upon Corinthian columns; though of the latter practice there is not, as we are aware of, any example extant. The same author furthermore observes,

that the Grecians, in their works, never employed the dentils under the modillions. It is, however, certain that the Romans were not so fastidious or over nice; for, in their most esteemed works, such as the Temple of Jupiter Stator, the Forum of Nerva, the Temple of Jupiter Tonans, and several others, we observe the dentils under the modillions; and these examples, it is presumed, will continue to authorize the same practice. The origin and history of these things are extremely remote, and known to but few, while the general effects of such compositions are known to all. If deviating, therefore, from what is little known and less felt, will contribute towards the perfection of that which all see and all approve, it cannot be justly censured.

The liberty, however, of deviating from the origin or reason of things, was by the ancients, and must by us, be exercised with extreme caution; as it opens a wide door to whim and extravagance, and leaves a latitude to the composer, which often betrays and hurries him into ridiculous absurdities.

When the modillion cornice is employed on large concave surfaces, the sides of the modillions and coffers of the soffit should tend towards the centre of the curve, as in the Pantheon, at Rome; but, when the concave is small, it will be far the better way to direct them towards the opposite point in the circumference, that the contraction may be the less perceptible, and the parts dependent thereon suffer less deviation from their natural form. The same rules must also be observed with regard to dentils, to the abacus, and bases of columns and pilasters, and likewise to the flanks of the pilaster itself. But, on convex surfaces, the sides of all these should be parallel to each other, for it would be very unnatural, and extremely disagreeable, to observe them narrowest where they spring out of the cornice, and diverging as they advance forwards, forming sharp angles and a sort of mutilated triangular plan, with enlarged solids, and diminished intervals, each calculated to destroy the usual proportions and beauty of the composition.

The entablature to the Corinthian order may be reduced to two-ninths, or one-fifth of the height of the column, by the same rules as are given in the Ionic and Composite orders: but, where it is rendered necessary, or it is deemed expedient, to make the entablature so small as one-fifth, it will be best to substitute the Ionic entablature, as Palladio has done in the peristyle of his Olympic Theatre, at Vicenza, and in several of his buildings; or else to retrench the dentils of the cornice, as in one of Serlio's, and in Scamozzi's profiles, the part of the cornice under the modillion band remaining then composed of only the ovolo and ogee, separated by a fillet, as in the several temples mentioned in Palladio's fourth book.

REFERENCES TO THE SEVERAL PLATES ON THE PRACTICE OF THE CORINTHIAN ORDER.

Orders, Plate XXI.—*Fig.* 1. Represents, on an enlarged scale, the entablature and capital of the Roman Corinthian order, proportioned by modules and minutes in manner before described by Sir William Chambers.

Fig. 2.—Represents the attic base and part of the column, proportioned in a similar manner to the preceding.

Fig. 3.—The antique Corinthian base.

Fig. 4.—An oblique profile of the capital, showing the projection of the leaves, by a line drawn from the astragal to the extreme of the volute.

Fig. 5.—Semi plan of the capital, showing the number and arrangement of the leaves, as likewise the segmental curves forming the outlines of the capital.

Fig. 6.—Plan of the soffit of the entablature, shewing the modillions, and the manner of finishing the soffit at the angles.

Orders, Plate XXII.—*Fig.* 1. A Roman Corinthian capital, from actual measurement, copied from the Temple of Vesta, at Tivoli.

Fig. 2.—Section or profile of the annexed capital.

Fig. 3.—Plan of the several parts of the above capital and base.

Fig. 4.—Elevation of the base and part of the cornice of the pedestal on which the order stands.

Orders, Plate XXIII.—*Fig.* 1. A Grecian antique Corinthian capital appertaining to a column.

Fig. 2.—Profile of the before-mentioned capital.

Fig. 3.—Grecian Corinthian antique capital to an antæ.

Fig. 4.— Profile also of the last mentioned capital appertaining to the same.

Orders, Plate XXIV.—*Fig.* 1. Grecian antique base to a Corinthian antæ.

Fig. 2.—Grecian Corinthian capital to an antæ.

Fig. 3.—Grecian antique base to a Corinthian antæ.

Fig. 4.—Grecian Corinthian capital to an antæ.

Orders, Plate XXV.—*Fig.* 1. The entablature and capital of the Grecian Corinthian order, imitated from the Choragic Monument of Lysicrates, commonly called the Lantern of Demosthenes.

Fig. 2.—Is a representation of half the base proportioned, as in the preceding examples.

Fig. 3.—Plan of the soffit of the entablature, showing the dentils, &c.

CHAPTER VIII.

THE PRACTICE OF PILASTERS, AND THE GREEK ANTÆ.

Columns differ from pilasters in their plans only; the latter being square or rectangular whereas the former are round.

Pilasters, when accompanied by columns in the Roman style, have their bases, capitals, and entablatures, the same as the columns, and their component parts are all of similar heights and projections: and, when complete, they are identified by the names of *Tuscan, Doric, Ionic, Composite,* and *Corinthian, Pilasters.**

Of the two opposite compositions, says Chambers, the column is, without any doubt, the most perfect as well as the most beautiful. Nevertheless, it would be impossible for composers in architecture to dispense with pilasters; and upon most, and if not upon all, occasions they may be employed with fitness and great propriety. In numerous instances, on various accounts, they are even preferable to columns.

Pilasters are stated to be of Roman invention; and, doubtless, the composition of them is an improvement upon the Greeks, who, instead of them, employed what is called the *antæ;* and, says Mr. Joseph Gwilt, very justly, one of the most objectionable practices of the day is, the servile imitation of this Greek antæ. It is, adds he, quite inconsistent with any regard to primitive types, from which the Grecian architecture is supposed to have originated. Added to this, their application in such very thin laminæ against the walls, as could be pointed to in some *pseudo-Grecian* buildings about the metropolis, produces a remarkably silly and unmeaning effect.

The Greeks employed these antæ in their temples, to receive the architraves where they entered upon the walls of the building; and in most, if not in all, of the examples of the antique, the front of the antæ is equal in diameter to the upper one of the adjacent column; the antæ being also of the same width at the top as at the bottom, and not diminished as in the Roman examples of pilasters. And these antæ, now so much the fashion in the metropolis, are executed, in imitation of the originals, equal in one direction to the diameter of the column in front; but, in flank, extravagantly thin in proportion to their heights, and neither their bases nor capitals bear any resemblance to those of the columns they accompany, and, it is supposed, in reference to the Greeks, that the Roman architects, being disgusted with

* The reader is referred to the following Plates of *Orders,* for various examples of pilasters and the Greek antæ, Plates VIII. IX., XVII., XXIII., XXIV.

the poor meagre aspect of these antæ, and the want of accordance in their bases and capitals, substituted *pilasters* in lieu of them; which, being proportioned and decorated in a similar manner with the columns, are, in the eyes of the most thinking and unprejudiced persons, more fitting, applicable, and seemly, as tending at once to preserve the unity and harmonious effects of all manner of architectural compositions wherein Columns and Pilasters accompany each other.

The compilers of this work are perfectly aware of the strong prejudice in favour of Grecian examples of every sort; nevertheless, they conceive it their duty to advise the juvenile student against the adoption of whatever appears to be not only inconsistent with, but repugnant to, *good taste.*

Several authors, says Chambers, are of different opinions about pilasters and their application, and to the end of the world such differences will exist in the minds of scientific men upon points of taste. A French Jesuit, says the same intelligent writer, many years ago, published an Essay on Architecture, which, from its plausibility, force, and elegance of diction, went through several editions, and operated very powerfully on the superficial part of European connoisseurs. The Abbe Laugier, who, it is understood, is the author adverted to, inveighs in the strongest terms against pilasters, and against every other architectonic form, excepting such as were imitated by the first builders in stone, from the primitive wooden huts; as if, in the entire catalogue of arts, architecture should be the only one confined to its pristine simplicity, and debarred from any deviation or improvement whatever.

To pilasters the learned father objects, because they are, in his opinion, nothing better than bad representations of columns. Their angles, says he, indicate the formal stiffness of art, and are a striking deviation from the simplicity of nature; their projections, sharp and inconvenient, offend and confine the eye; and their surfaces, without roundness, give to the entire order a tame and insipid effect; they are not, as he thinks, susceptible of diminution, one of the most pleasing properties of columns: and, in his opinion, they never can be necessary. To sum up the whole, " he hates them; his aversion was first innate, but it has been subsequently confirmed by the study of architecture."

Now, as regards the reverend father's inborn aversion, much need not be said; and as to the several other objections, as they consist more of words than meaning, on that account they seem not to require argumentative refutation: conviction on the face of his own showing is too evident. To assert that pilasters are not susceptible of diminution, at once discovers very little acquaintance either with books of architecture or with buildings. Innumerable are the instances, in the remains of antiquity, of their being diminished; and, in particular, when associated with columns. They are so in the Temple of Mars the Avenger, in the Frontispiece of Nero, in the Portico of Septimus Severus, and in the Arch of Constantine, at Rome. Scamozzi always gave to his pilasters the same diminution as to his columns; Palladio has diminished them in all his buildings at Venice; and Inigo Jones has likewise done the same in many of his designs, and in particular at Whitehall.

And if we trace back to the origin, and consider pilasters either as the representation of the ends of partition-walls, or trunks of trees reduced to the diameter of the round trunks, but left square for greater strength, the reason for diminishing them will, in either case, be manifest.

It is, also, a strange error to suppose, or to assert, that pilasters are never necessary; but that columns will, at all times, answer the same purpose: for, at the angles of most architectural fronts to buildings they are indispensably necessary, both for solidity and beauty. For the angular support, having a greater weight to bear than any of the rest, they should be so much the stronger, so that its diameter must be increased, or its plan altered, from the circle to the square. The last is certainly the most reasonable expedient; but, chiefly so, as it obviates a very striking defect, occasioned by employing columns at the angles of buildings; which is, that the angle of the entablature is left, as it were, apparently suspended in the air without any apparent support; a sight very painful and disagreeable in many oblique points of view, and at the same time very unsolid.

It is customary in most, if not on all, occasions, to porticos and other detachea compositions, to employ columns at the angles; and it is extremely judicious so to do: for, of defects such as those described, the least should be preferred; and although, says Chambers, the reverend Father Laugier, whose objections have been cited, could not see any reason for rejecting detached pilasters when engaged ones are permitted, yet a very substantial reason may be assigned, which is, that detached pilasters, in certain oblique views, appear thicker than they do in front, and nearly in the ratio of seven to five; but, of course, when seen in front, they will appear well-proportioned; yet, with respect to the columns they accompany, they never can appear so when viewed upon the angle; as may be observed in the colonnades at Burlington-House, in Piccadilly, London; and in the portico of Saint George's, Hanover Square; as well as in the extraordinary *applique* to the front of the new theatre in Drury Lane.

Engaged pilasters may be employed, and appositely, in churches, galleries, halls, and in other exterior decorations, to save room; for, as they seldom project more than one quarter of their diameters, they will not occupy near so much room as attached three-quarter columns. Pilasters are also frequently introduced, with great propriety, in exterior decorations; and, very frequently to avoid superfluous expense. The effects of this may be observed in many of the splendid mansions of the nobility in the metropolis, and in many other towns; at other times pilasters accompany columns, being placed beyond them, to support the springing of the architraves, as in the Corinthian portico of Saint Martin's Church, London, in which instance the pilasters are continued all round the building, and in the intervals between the several loggia porticos, as well as from the latter, up to the grand portico in front, allowed to be the most perfect of the description in the British Metropolis. Blondel also says, that pilasters may likewise be employed instead of columns, to form porticos; but, among the Roman antiques, examples of this sort are not to be found. The Choragic Monument of Trysallus, at the foot of the Acropolis, may,

however, be considered as a Grecian example, a fac-simile of which, as regards proportions, may be seen at the entrance to the chapel in Essex Street, Strand. The proportions of the monument adverted to are very much and justly admired; but, as regards the square detached pillar, or pilaster, in the centre, it cannot receive the approbation of scientific men when applied as a portico round an entrance, the aperture of which is in the centre of the portico *applique.*

When pilasters are introduced as chief ornaments in compositions, they should always project at least one-quarter of their diameters beyond the walls, as Scamozzi teaches, and as they have been executed by Inigo Jones, at Whitehall; which projection produces that degree of boldness requisite in buildings of a certain standard, and in the Corinthian and Composite orders is also more regular: and, because the stems of the volutes, and the small leaves in flank of the capital are then cut exactly through their centres. But, if the cornices of the windows should be continued in the inter-pilasters, which is sometimes the case; or, if there should be cornices to mark the separations between the principal and second stories, as at the Mansion House, in London; or large imposts of arches, the projections must then, and in such cases, be increased; provided they are not sufficient to stop the most prominent parts of such decorations, it being extremely offensive to an architectural eye to observe several of the uppermost mouldings of an impost or cornice cut away perpendicularly, in order to make room for the pilaster, while the cornice or impost on each side projects considerably beyond it; as is the case in many public buildings of great notoriety. Mutilations should, on all occasions, be studiously avoided, as being destructive of perfection, and strongly indicates either inattention or ignorance.

When pilasters are placed behind columns and very near to them, they should not project above one-eighth of their diameter, or even less, unless there should be imposts, or continued cornices, in the inter-pilasters; in which case, whatever has been before observed must be particularly attended to. Where flutings are required to the shafts of pilasters, the same proportions should be followed as in the same ornaments to columns.

We now give a description of three plates of Grecian and Roman ornaments, which are copied from the most approved specimens of ancient buildings.

Plate XXVI. *Fig.* 1, represents the ornament between the bead and small projecting band of the top of the column of the Temple of *Minerva Polias,* at Athens.

Fig. 2, is the ornament on the cymatium of the door of the same temple, stretched out on a flat surface.

Fig. 3, is the enriched moulding of the cap of the same temple, shewing the finishing of the external angle.

Fig. 4, *egg and tongue,* with beads below, belonging to the same cap.

Plate XXVII. *Fig.* 1, shews the ornament on the door of the Temple of Erectheus, at Athens.

Figs. 2 and 3, represent pateras from the same temple.

Fig. 4, is a Grecian ornament, applicable to a similar purpose as *fig.* 1, but more elaborately enriched.

Plate XXVIII. *Fig.* 1, represents an enriched ovolo and bead.

Fig. 2, shews an enriched ovolo, the *eggs and tongues* being greatly varied in their proportions when compared with the preceding ornament.

Fig. 3, shews an enriched *ogee.*

Fig. 4, is an enriched ogee, the enrichments being of a more splendid character.

Fig. 5, represents an enriched *torus.*

Fig. 6, is also a *torus,* but more elaborately enriched.

Fig. 7, is an enriched *plinth.*

Fig. 8, is an enriched *plinth,* copied from a fragment in the Capitol at Rome.

Fig. 9, represents an enriched *cymatium,* copied from the Temple of Jupiter Stator, at Rome.

Fig. 10, is an enriched *cymatium,* varying from the last, both in curvature and also in the enrichment.

Fig. 11, represents an *A la Greque fret.*

Fig. 12, is an enriched *bead.*

Having now concluded our observations on the Five Orders, and given such directions as we consider will enable the lovers of architecture to appreciate the beauties and fitness of each, and where and in what cases each may be applied with the greatest propriety, we shall now proceed to give directions for proportioning the various parts of buildings, so as to make them suitable to the purposes for which they are intended.

BOOK II.

OF BUILDING IN GENERAL.

INTRODUCTION.

We have, in the two preceding volumes, treated on the component parts of Building, under the respective heads of Carpentry, Masonry, Bricklaying, &c., we shall now, in order to render the whole complete, attempt to give a general view of the subject; and, that the reader may be enabled to follow us, in fully comprehending our description, we shall first explain, those technical terms, used by architects and builders, which require to be previously understood; and then present the various parts of a building, in their natural order, with such remarks as may be practically useful.

To those who, by practice and experience, are already acquainted with the subject, such an arrangement and explanation cannot but be agreeable; and to those who do not possess such advantage, this mode of proceeding will be found essentially useful, as it will most effectually conduct them to an acquaintance with the most prominent features of the art.

The student is presumed, of course, to be acquainted with the geometrical principles contained in this work; and, more particularly, all the *definitions* of *superfices* and *solids*. This information is indispensable, as the parts of a building are either the simple forms of some one geometrical solid, or compounded of portions of several: and, although the forms of objects are most easily understood by a reference to such as we have been accustomed to see, yet, as the same forms are not known to all classes of men under the same names, the language of geometry is the only language which can be employed to convey ideas of magnitude, form, and position.

In speaking of ***Length*** and ***Breadth***, as applied to any object fixed to the horizon, as a building, we mean such dimensions as are measured in an horizontal plane. *Depth* is the distance which some part recedes from a surface, without regard to the position of that surface. *Height* is estimated in a vertical line; that is, in a line perpendicular to the horizon.

Rooms are the interior vacuities or habitable parts of a building. They must be closed on all sides for security, lodging, and comfort, and for all manner of purposes to which they may be applied. For the convenience of entering rooms, or of passing from one room to another, apertures should be made on one or more sides, which may be closed at pleasure, by means of moveable parts known by the name of *doors;* and where the apertures are sufficient to give the

effect of two rooms being united or thrown into one, then such apertures are closed by two *doors*, commonly called *folding doors.*

Rooms are disposed one above another, or by the side of each other, as may be found convenient. One side of every room must be an horizontal plane, for the convenience of walking upon, and for placing various articles of furniture in the most secure position; this side is denominated the *floor.* When several rooms are placed side by side of each other, the *passages* or communications will be most conveniently effected when all the floors are on the same level.

Again, for the convenience of the inhabitants, and to add to the strength of the building, not only the exterior, but likewise every side, of a room which appertains to the floor, should be carried to a certain height from it, in a line perpendicular to the horizon. Hence, it is clear the floor must be in a straight line, and the side thus carried up must be a plane surface.

The solid parts contained between the vertical surfaces are the *walls.* The remaining sides, opposed to the floor, are denominated the *ceilings.* The latter parts may have such forms as the materials employed in the construction will admit of. The forms of many parts of buildings are altogether arbitrary, as to their use; they are, therefere, determined by the ideas of economy or beauty; upon such principles as these the formation of ceilings are regulated. If economy be the chief object, the ceiling is a plane surface as well as the floor; but in buildings of a first rate character, the ceilings should be richly ornamented, so as to correspond with the other parts of the structure.

The surface of walls generally will not only be planes, but they will also be parallel to each other, and equally thick throughout; but in superior buildings, walls are frequently enriched with pilasters, panels, and other ornaments, which have an excellent effect in destroying the sameness of plane surfaces. The forms of walls are determined by the line upon which they rise from the ground: thus, if the line be straight, the wall is called a ***straight wall;*** or, if it be circular, the wall is said to be *circular,* and so on.

Straight walls are those most generally built; circular walls occasionally; but those of other forms are elliptic, &c., but they seldom occur in the common practice of building, at least in exterior walls.

A wall which divides one apartment from another, is called a *partition* or *division wall.*

When two walls form an external or internal angle, the line of concourse made by the two sides is termed an external or internal *quoin,* or an external or internal angle.

To combine strength and stability with economy in an edifice, the walls, as they rise, should diminish in thickness; keeping in view that a straight line, ascending from any point of one of the surfaces, ought not to fall without that surface. If the line thus ascending fall entirely within the solid mass, the face of the wall is said to *batter;* and the horizontal distance between the vertical line, ascending from any point in the line terminating the upper extremity of that surface, and the line terminating the lower extremity of the same, is called the ***battering of the***

wall. The exterior surfaces of walls are generally executed in planes perpendicular to the horizon. When the face of a wall is not one entire or continued surface, or when it is formed by two or more continued surfaces, each rising from the horizontal base which forms the top part of the wall below; the part thus connecting the two surfaces is called an *off-set.*

When a house consists of several apartments one above another, each apartment, or as many as may be on one floor, is called a *story;* and when each story of a house has a number of apartments, the aggregate of the apartments on each story is called a *suite of apartments,* that is, when the rooms are connected by folding or other sorts of doors.

When a building consists of two or more stories, it is usual to diminish the walls from the inside faces, by breaking each side into several surfaces, so that the off-sets may be immediately under the ceilings; the off-sets thus made will not only prevent them from being seen, but will also afford a secure support to the floors. Hence, also, the joists of the floors extending from one side of the building to the opposite side, will tie the walls firmly together, and prevent them either from spreading or approaching towards each other.

The exterior walls of a building are not only connected by the floors, but likewise by the division or partition walls constructed therein.

Floors are the superficial surfaces for walking upon; but this term will be more properly applied to the thicknesses of timber or stone floors. Therefore, when apartments are placed over each other, the solid parts contained between the ceilings of the lower and upper apartments, and the surfaces for walking upon in those above, are called the *floors.*

Floors constructed of stone are more particularly denominated *pavements.* The surfaces upon which we walk may therefore with propriety be called the *levels of the floors or pavements.*

The distance between the two nearest surfaces of parallel and opposite walls is called the *span,* or between external walls, the *span of the building.*

The upper and exterior parts of a house, which extend over the area of each of its floors, in order to protect and secure the interior from the effects of weather, is denominated the *roof.*

The forms of roofs, and the methods of constructing them, are various, and depend upon the nature of the climate, materials, and prevailing custom of the country. Flat roofs were mostly used by the antients; but the Greeks, from their country being at times exposed to heavy rains, soon perceived the inconvenience of flat or horizontal roofs. They accordingly constructed their roofs in two inclined rectangular planes, sloping from the middle towards the sides, and inclining equally to the horizon, so as to terminate each wall in an isosceles triangle with an horizontal base. The proportion of the height of this triangle to its base was in the ratio of one to eight, or one to nine; or, speaking technically, the height was one-eighth, or one-ninth, part of the span.

The Romans, who had still more occasion than the Greeks to provide for the speedy discharge of rain from their houses, did not alter the Grecian form of the roof, but varied its proportion, making the height of their roofs from one-fifth to two-ninths of the span. After

the decline of the Roman Empire, high-pitched roofs were very generally introduced; the standard form being that of an equilateral triangle. No part of the practice of building has been more the object of caprice than the proportions of the roof. Even in the present day, we meet with almost every variety of proportion which can subsist between the height of the roof and its span. In ordinary dwellings the height varies from one-third to one-fourth part of the span; in other cases, the proportion depends upon the taste of the architect, the style of the building, and also upon the material to be used as an external covering.

Roofs that are high-pitched discharge rain and snow more quickly than those which are lower; they are less liable to be stripped of their covering by the wind, and the rain is not so easily blown through their joints; but they are more expensive than low roofs, as they require longer timbers, and a greater quantity of covering. But, though low roofs possess the advantage in point of economy, they require large slates and greater care in the execution.

Apertures built in walls for the admission of light are called *windows.* Those for egress and regress are termed *door-ways.* The framed work for closing the aperture is called *the door,* which is made of various kinds of wood, and sometimes of metal, according to circumstances. The surfaces which surround the aperture, and which are contained within the two surfaces of the wall, are called the *sides of the aperture.* The lowest side of every aperture is termed the *sill,* and is always parallel to the horizon; the two sides which spring upwards from the sill are called the *jambs,* and these should be perpendicular to the horizon, and of an equal height. The remaining side, opposed to the sill, and which connects the tops of the jambs, is termed the *soffit.* The *soffit* is generally a plane surface, consisting of parallel planes; and since each jamb rises to the same height, the soffit will, in this case, be parallel to the horizon. Occasionally, however, the section of the soffit, parallel to the surface of the wall, is some part of a circle, not exceeding the semi-circumference. The points from which the section rises from the tops of the jambs are called the *springing-points.* The solid contained in the soffit and the vertical surface of the wall is denominated an *arch;* in this case, the soffit is termed *the intrados of the arch.* If the section of the soffit be less than a semi-circle, the arch is called a *scheme-arch;* but if a semi-circle, it is termed a *semi-circular arch.* In some cases, the jambs do not ascend perpendicularly to the horizon, but stand at equal angles therewith, so as to approach nearer towards each other at the summit than at the bottom: and examples of this sort are not unfrequent in antient and modern works, particularly the Egyptian.

The sections of apertures, parallel to the face of the wall, are sometimes entire circles, or entire ellipses, having one axis parallel to the horizon; and, consequently, the other perpendicular thereto: in this case, the aperture cannot properly be said to have sills, jambs, or soffits. Occasionally, the section of the soffit, parallel to the surface of the wall, is constructed of two equal and similar concave curves, meeting each other in a receding angle, and in a verticle line which divides the aperture into equal and similar parts, so that the whole opening may form a symmetrical figure: arches of this description are termed *Gothic arches.*

Semi-circular-headed windows have a pleasing effect in circular walls, particularly when the exterior surface is an entire cylinder, and the diameter of considerable magnitude; but, in a small building, they greatly weaken the construction of the walls, and produce a disagreeable effect by the over-hanging of the head, particularly the Egyptian.

Since apertures for the admission of light are indispensable, it is essential, as well for the strength as for the beauty of the edifice, that the sills of all the windows in the same story should be in the same straight line; and, also, that each jamb of a window in any story should be in a straight line with the jamb of a window in every other story.

The solid parts of walls between apertures are termed *piers,* as also the external parts annexed to such apertures, which are identified as external piers, or *quoins,* commonly so called.

When any uninterrupted part of the exterior walls of a building contains more than two equal and similar windows on one level, the beauty of their arrangement will require that the intermediate piers be equal in breadth; for the same reason, the extreme piers in any apartment, which has one or more such windows, ought to be equal to each other. In all cases, where fanciful dispositions of the apertures are attempted, they ought to be disposed in symmetrical order.

Windows, in modern rooms, in which they are introduced to light the apartments, are, by means of jambs standing obliquely to the faces of the walls, made widest within; and these obliquities are called the *splays* or *splayings of the jambs,* or more simply the *splays:* and in these cases the windows, or jambs, are said to be *splayed.*

Each jamb of a window will generally consist of four vertical planes within the two surfaces of the wall. The first plane from the exterior surface of the wall forms an external right angle with that surface; the first and second planes make with one another an external right angle; the second and third, an internal right angle; and the third and fourth, an obtuse angle. The fourth plane is generally continued down to the floor, in order to form the side of the recess made from the inside of the wall below the sill of the window; so that two of the three sides of this recess are formed by the continuation of the two planes of the jambs next to the inner surface of the wall, and the third face is a surface parallel to that surface joining the continuation of the line of concourse at the meeting of the planes which form the obtuse angle in each jamb.

Walls underneath windows are generally recessed from the bottoms of the windows to the levels of the floors; and these increase the areas of the floors. Each vertical side in the same plane with the vertical side or jamb of the window, is termed the *side* or *elbow of the recess;* and that surface of the recess which is parallel to each side of the wall is denominated the *back.*

The most usual form of a room is that of a rectangular prism; and, consequently, it consists of four vertical sides, and of two sides parallel to the horizon.

In large edifices, for the sake of beauty and variety, the forms of apartments, as they rise from the floor, are sometimes made circular or elliptic; and sometimes, they are compounded of a rectangular portion in the middle, and of symmetrical circular segments at the ends, having the chord or diameter extending either the whole breadth of the end to which it is attached, or only to a part of such breadth, leaving an equal portion of it at each extremity of the chord. In this case the faces of the walls consist of two opposite rectangles, and the ends of equal portions of a cylindric surface.

When the floor of a room is rectangular, the ceiling is usually of the same form. In magnificent apartments, however, ceilings are often made to rise from each side to the middle in a concave shape, presenting the surface of a cylinder, having its axis parallel to the horizon. The chord of the cylindric section is extended to the breadth of the room; so that, in every section parallel to one of the ends of the apartment, the upper part of that section will be an equal segment of a circle.

Ceilings, formed simply of cylindric surfaces, are termed, by mechanics, *waggon-heads,* in imitation of the coverings to broad-wheeled carriages; but the proper term for soffits to rooms, whether to halls, churches, chapels, or domestic apartments, is *coved ceilings,* which are of various forms.

The cylindric or coved ceiling is not the only form which a rectangular apartment will admit of. It may also consist of a quadrantal portion of a cylindric surface, rising from each vertical face to a level oblong in the middle; and this compound form, also, is termed a *coved ceiling.* The multifarious dispositions of which are infinite.

And without altering the figure of the floor, the ceiling may be formed of cross arches; that is, such that each arch may coincide with the surface of a cylinder, having its axis parallel to the horizon, and to the sides of the apartment. When the summits of each arch rise to the same height, this kind of ceiling is called a *groin,* or is said to be a *groined ceiling.*

The rectangular floor will also allow of a concave ceiling in an ellipsoidal or spherical form, with one of its axis' in the line of intersection of the two diagonal planes, which may be conceived to pass through each of the four lines terminating the vertical sides, two by two. In this case, the planes which form the four vertical sides of the room, will not meet the ellipsoidal or spherical surface in a straight line, but in a curve of an elliptic form, or in a circular segment rising from each corner to the middle of each vertical adjacent face.

As the circles or arcs, which form the lines of demarcation between the ceiling and the vertical faces of the apartment, descend from the middle of each upright face to the vertical line, formed at the angle, by those faces, the ceiling is termed a *pendulous ceiling;* or it is denominated a *pendentive* one, being suspended in the manner described.

The floor of an apartment may have any geometrical figure that the fancy of the architect may suggest. A building occupying the site of an equilateral triangle, or of a regular hexagon, will divide without any loss of space into apartments, having also their floors in the forms of

equilateral triangles or hexagons, and doors may be inserted in the middle of the side of one apartment without destroying the symmetry of the adjacent room; yet none of those figures are so convenient as the square or rectangle: however, they are sometimes employed for the sake of variety, where motives of economy do not restrain the expense.

When the *form* of an apartment is spoken of, we mean that of the *floor;* since all the horizontal sections below the ceiling are equal and similar figures.

Forms of all manner of rooms, besides the square, or such as are rectangular, are denominated *fanciful,* or fancy rooms, which may be made very beautiful.

The floors of apartments are, however, seldom regulated by the forms of the buildings, But, as the sites of edifices are generally rectangular, apartments constructed in the forms of polygons occasion not only great waste of space, but also of materials; and such forms likewise require to be fitted with more than ordinary attention to elegance: hence, when employed, no restraint should be laid as to expenses. It, however, rarely occurs that a suite or series of rooms have more than one polygonal apartment, unless it may be in corresponding parts, in order to render the whole disposition symmetrical.*

Apartments having others immediately above them, and on every side, cannot be sufficiently lighted. Hence it would be improper to build a house of a rectangular form, and of two or more stories, with more than two apartments in breadth. If, therefore, it is desirable to build upon a large scale, the fronts of the edifice, on all sides, must be extended, or the middle of the area be left open without any building, or certain parts must be left entirely uncovered, or at least with sufficient exposed apertures, to be filled with glass for the admission of light.

As it is desirable to render every apartment conveniently accessible, without passing through any other, a certain portion of every building should be taken for this purpose; and the parts thus occupied, when not very wide, are termed *passages.*

Passages of communication may be lighted in various ways. If there be only one series of rooms in the breadth, their situation must then be on the sides of the building, and consequently they may be lighted by apertures in the exterior walls, to any degree that may be desired: but if the whole, or any part, of the building has two rooms in breadth, and more than two in length, the situation of the passage must be naturally in the middle, with one room in depth on each side of them.

If the rooms are not very numerous, the passage may be lighted from one of the ends, and when the length is considerable, it ought to be lighted from both: but, when the edifice is very long, cross passages should extend to the sides; and these will afford the most convenient and private entries to the rooms on each side of them.

The apartment or space for the stairs must have apertures through all the floors, or be entirely

* Polygonal rooms are seldom used for mere domestic purposes, being mostly intended for music or other entertainments, where large companies meet for amusement.

open to the top, except the solid parts for walking upon, in order to give the occupants sufficient light. The flat parts on the same level with the floor are called *landings*, and these afford passages into the surrounding rooms. This mode of approaching them is adopted in all descriptions of edifices; but, in small buildings, it is the only way of entering the rooms, particularly in the upper stories.

When the apertures for the stairs are surrounded on all sides with rooms, the passages are usually made entirely round the stairs, with apertures in the walls of enclosure, in order to light the adjacent passages.

In large buildings, the number of stair-cases should be proportioned to the magnitude of the edifices; and the former should be regulated so as to require the fewest passages, and by these means due portions of the occupants may be kept desirably separate from each other; but with such means of communication as to be accessible to certain individuals of the house, at the will of the proprietor.

In the uppermost stories of buildings, passages may be introduced almost in any direction which may give the most convenient access to the apartments, as light, it is presumed, in most of such cases, may be easily supplied from apertures left in the ceilings or adjacent roofs.

In some magnificent edifices, the rooms in the several heights are so constructed that each story may be connected by one lofty apartment, that is, by means of large apertures in each floor; and, in this manner, the rooms of the surrounding buildings may be accessible, that is, by means of the residual parts of the floors on the sides of the apertures adverted to.

As it is necessary for the comfort of the inhabitants that the rooms should be kept of proper temperature at certain seasons of the year, fires must be introduced, for the purpose of communicating warmth to them. To effect this in the most convenient manner, certain recesses, commonly of a rectangular form, are made in the walls on the sides of the rooms; and these serve as receptacles for fuel; and, to take away the smoke, tubes or flues, are carried up from these recesses, in the thickness of the wall, to the summit of the building. The openings from the sides of the rooms are called the *fire-places;* and the tubes, or flues, for carrying off the smoke are denominated the *funnels,* or *flues.* The solid parts of the walls, between the funnel or flues, and the rooms, are called the *breasts of the chimnies.* As the forms of the apertures for the fire-places are generally rectangular, the vertical sides are called *jambs;* and the sides which stretch over the tops of the jambs, parallel to the horizon, are called the *mantles.* The portion of walls, containing the terminations of the chimnies, which are always carried above the roofs, are called the *chimney-shafts.* When walls contain a great number of flues, they are called *stacks of chimnies:* and, if the funnels, or flues, approach very near to each other, the solids which divide them are termed *withs.*

To prevent chimnies from smoking, they ought to be so constructed that the current of air which naturally presses towards the fire-places, may not proceed entirely through the fires, but in such manner that portions of the air may pass immediately over the flame, so as to force the

smoke up the chimnies; for as the air is heated it becomes more rarified and ascends with a velocity proportioned to the caloric it contains.

With regard to the construction of the funnels, or flues, sharp angular turns must be avoided, as they retard the ascent of the smoke. The form of the chimney is not always the cause of apartments being annoyed by smoke; it has been proved, beyond doubt, that much depends upon the situation of the building, as similar forms, in different situations, will often have different effects. Consequently, in building chimnies, no effectual precaution can be taken, nor can any remedy be applied until the fires are made. Without the agency of contrary currents of air, smoke may be occasioned from the mere form of the chimney; for if the flues are too narrow at the top, the smoke will not discharge so quickly as it is generated; and in time, therefore, it must fill the passage or flue, and ultimately the apartment itself. To provide, as much as possible, against smoke, in the building of chimnies, the apertures should be carried up in gentle windings or curvatures, particularly near the top, as all angles and sharp turnings are obstacles. For the same reason, the interior surfaces should not be left rough, but should be smoothed over with plaster; and all pieces of lime, shivers of stone, or broken brick, left by the carelessness of workmen, should be removed, as the wall is carried up. On this account, too, circular flues permit the smoke to pass more freely than those which have rectangular sections; and, therefore, if expenses are not primary considerations, they should be so constructed that their surfaces may be those of hollow cylinders. If these precautions are found insufficient, the narrowing of the apertures above the fires should be tried; but as these remedies are sometimes inconvenient, they ought, perhaps, to be the last of the chimney-doctors' resources.

The doctrine of smokey fire-places is as yet very imperfect; many experiments have been tried, but still we have not obtained any general and satisfactory results, notwithstanding the celebrity of those who have made them. The writings of Dr. Franklin, Count Rumford, and Mr. Clavering, contain details of experiments on smokey chimnies, and the works of those authors may be consulted by such as wish to enter more fully into the subject.

As the *utility, fitness, and comfort,* of every building must greatly depend upon the proportions of its essential parts, we shall in the following chapter call the attention of the reader to that subject, as being one of the greatest importance in the practice of architecture.

CHAPTER I.

PROPORTIONS OF THE APERTURES OF DOORS AND WINDOWS.

In ancient buildings, door-cases were formerly constructed of trapezoidal forms, that is, wider below than above; this probably arose from such doors possessing the inherent power of shut-

ting without the aid of the passengers. Instances of these forms are not common, in the present day; they may, however, be seen in the Bank of England, and several other modern structures, but, generally, the doors are hung upon such scientific principles as not to require any trouble in shutting. This desirable effect being now produced by very ingenious mechanical contrivances.

The dimensions of the apertures of doors should be regulated by the magnitude of the buildings. All the doors in the same stories are generally made to correspond to each other in heights. In private houses they may extend from three to four feet in widths, and from seven to eight feet in heights, or more, in proportions to the heights of the stories. When door-ways exceed three feet in width they should be closed with folding leaves or doors in order that the rooms which they separate may be occasionally united: this practice is prevalent at the present time, and is found very convenient for the reception of company.

When the front of a building has only one door, it is generally placed in the middle, not only to preserve the symmetry of the front, but also to shorten the access to the various apartments. But in town houses this disposition is not convenient, since most dwellings have only one apartment in the extent of the front, consequently, the external doors are, in most cases, if not always, at one end.

With regard to windows, the height of the sills were formerly from three to three feet and a half high from the floors, which was convenient for leaning upon; but of late years, in imitation of the French, it has become the fashion to make the sills of the windows equal, or nearly so, with the levels of the floors, particularly in the principal stories; and in each of the others, the heights of the sills are now reduced to two, or two feet six inches, or thereabouts. By adopting this mode, apartments receive more light, and certainly have a more cheerful appearance.

In regulating the dimensions of windows, it may not be superfluous to remind the proprietor, or builder, that, although it may be very pleasant in summer to have the apertures for the windows either very large or very numerous, yet the extraordinary area occupied by them will render the apartments very cold in winter; and to provide against these inconveniences, double glass frames are sometimes deemed indispensably necessary. In France, and in Italy, where the climate is warm, such windows are admissible; but, in the streets of London, we are at a loss to present any apology for their introduction; they seem to be of little use, except to inhale the muddy exhalations of dirty streets. Verandas are, in many cases, equally absurd; they are frequently to be observed on the northern sides of our streets and squares, which the rays of the sun seldom or ever visit, serving only to render apartments dark and gloomy, without imparting any equivalent advantage. These observations will readily suggest that there is a happy medium, and that should be adopted, where no object of an untoward nature occurs to prevent it.

CHAPTER II.

PROPORTIONS OF APARTMENTS.

As fitness should be the first feature, not only in every building but also in every part thereof, the proportions of apartments must depend very much upon the use to which they are intended to be applied. The lengths of dwelling-rooms may extend from one to one and a half or to twice their breadths, and in galleries even four times. In general, however, it is to be observed, that the greater the capacities are, the more the lengths may exceed the breadths. Thus, in small houses, the dining and drawing rooms may be square; but, in larger edifices, they may extend even to be a double square. With regard to the heights, three-fourths of the breadths are esteemed good proportions to the other dimensions. When the ceilings are coved or arched, the heights may be equal to the breadths, or to one and one-quarter the breadths. The breadths of the principal passages may be one-third of those of the principal rooms; and the breadths of passages, or of passages belonging to a common house, may be one-fourth of the breadths of the principal rooms: the heights of passages should be the same as those of the rooms, but the lengths must be regulated by the buildings. It must, however, be remembered, that the utmost height that can be considered proportionate should be adopted at all times, this being a property so conducive both to health and appearance.

When the heights of rooms exceed the proportions adapted to the other dimensions, cylindrical vaultings, coves, domes, groins, &c., may be introduced, as may be best suited to the use made of the apartments.

The heights of ceilings are necessarily regulated by those of the principal rooms of a story; hence, apartments of an inferior description will often have their ceilings disproportionately high. To remedy this, floors may be introduced so as to divide the heights into two stories; the lower one of a height proportioned to the length and breadth of the room, and an upper one sufficiently high to admit of persons walking erect. In this case, the upper story is termed a *mezzanine* or *intersole.*

Mezzanines, when they can be introduced, are exceedingly convenient for servants, lodging-rooms, dressing-rooms, wardrobes, &c.

In buildings where beauty and magnificence are studied rather than economy, the halls and galleries may be raised to the height of two stories. Saloons are frequently raised the whole height of the building, and have galleries at the height of the stories around the interior circumference, for the purpose of communication with the various apartments.

A *Stair*, or set of steps, is a structure by which persons may ascend to, or descend from, any story with ease and pleasure.

The surfaces upon which our feet are set, in the act of passing up or down, are called *treads;* these should be equi-distant horizontal planes, placed at convenient distances.

But when two treads are joined together by a third plane, rising perpendicularly from the plane of the treads, so as to have the breadths of the lower treads on the front, and the breadths of the upper treads on the back of these new planes, the third series of planes thus introduced are called *risers*

Every riser and tread forming an external right-angle is called a *step.*

The line of concourse formed by the meeting of the riser and tread of a step, is called the *nosing*

Sometimes the tread of a step projects, in a small degree, beyond the riser below it, and is rounded so as to make it at once strong and agreeable to the eye; this termination is also termed the *nosing* of the step.

Steps may be supported at each end by walls, and this is very frequently done in common houses.

A series of steps, having all the treads equal, is called a *flight of steps.*

It is easy to conceive that a stair, consisting of one flight, must be very inconvenient, on account of the great length of the area which would be required to contain it. It will be proper, therefore, to show in what manner the direction of the ascent may be changed, in order to prevent the length from exceeding the dimensions of the rooms adjacent.

And this difficulty may be overcome by allowing a double area for the stair, with a floor between them, extending from the entrance where the stair begins to such a distance as will leave sufficient breadth for the passenger to pass from one stair-apartment to the other. Now it only remains to construct two equal flights, each half the height of the story; the first being placed on a proper floor, and made easy of access; and having a surface for walking upon, on a level with the top of the highest riser, and extending over the whole breadth of the two stair-apartments. The next flight may be raised upon this floor, and may have a similar floor at the top with its surface on a level with the floors of those apartments in the story to which a communication is required.

The floor between the two flights is termed a *half space* or *resting place;* and that upon a level with the floor of the story, at the head of the second flight, is denominated a *landing.*

And here the landing naturally points out the situation of the door or doors.

In this manner we may ascend to the uppermost stories of buildings, or to as many stories in them as are deemed requisite.

The two apartments, or *areas*, each containing flights of steps, are collectively termed the *stair-case.*

The wall which divides the two flights is called the *newel* of the stair-case. As walls

surrounding the stair are commonly carried up in the form of rectangular prisms, by way of rendering the turning easy to the passenger, the angles of the newels are generally reduced by forming them into semi-cylinders.

When the apartment, or arena, allowed for the stair-case require the steps to be inconveniently high, instead of the half-space, steps are introduced with their treads diminishing in breadths towards the newel.

The diminished steps, thus introduced, are denominated *winders;* and by their means the stair is made to consist of two equal flights, with a series of winders between them.

When the thickness of the newel, or wall between the flights, is very considerable, another flight of steps is sometimes inserted between the planes or faces of the newel, extended into the passage of the stair, round which the person ascending has to turn, in order to proceed to the upper flights. By this introduction, the stair is made to consist of three flights, and two level parts, called *quarter-spaces*, between each of the two flights.

These quarter-spaces are also occasionally occupied with winders, by which means an easier ascent is gained, and the want of room compensated for as much as possible.

From what has been said, it may be easily conceived that floors of stairs may have many different forms, and that the steps may always be properly adapted to those forms, with convenient quarter-spaces, half-spaces, and landings, where required.

The apartment, or *arena*, for the stairs being a prismatic cavity, the form of the stair-case is denominated from the area contained within its walls, at the base or floor from which the adjacent walls rise.

Therefore, if the floor underneath is rectangular, quadrangular, circular, or elliptical, the stair-case must also be rectangular, quadrangular, circular, elliptical, or as the case may happen.

Now let us conceive the newel to be disengaged from the ends of the steps, so as to form a complete prism, and to be taken out from the level of the floor and the steps to remain firm; the stair thus constructed is a *geometrical stair*.

The open space left by the newel is called the *well-hole*.

The continuation of the ends of the steps next to the well-hole is denominated the *string*.

The surface of the stair, opposed to the floor or to the steps, as seen from below, by those ascending, is termed the *soffit*.

The newels of stair-cases are sometimes constructed hollow, with apertures through the sides.

Examples of this kind may be seen in St. Paul's Cathedral, where the stairs are cylindric, or stand upon circular bases; the examination of which will afford great satisfaction to those who derive pleasure from scientific research.

The grandest example of a geometrical stair-case, upon a circular base, may be seen in St. Paul's, which cannot fail to attract the attention of the mathematician, geometrician, and architect.

A stair-case having a newel in the middle, is called a *pillared* or *newelled stair.*

A stair contained within a circular or elliptical wall is called a *winding stair;* or one which is circular or elliptical, as the case may be.

Geometrical stairs are much more elegant than *pillared* stairs; and those that have rectangular bases, when constructed without winders, are deemed handsomer than geometrical stairs which rise from a circular or elliptic base; unless, indeed, the diameter be very large, as in the case adverted to, in the sublime structure of St. Paul's.

In ordinary houses the breadths of the steps are generally from 10 to 12 inches, the heights from 6 to $7\frac{1}{2}$ inches, and the lengths from 2 feet 6 inches to 4 feet. In more stately mansions the steps may be from 4 to 6 inches high, from 12 to 15 inches broad, and 6 feet long and upwards, in proportions thereto.

Any portion of the exterior side of a building which protrudes itself towards the spectator, is denominated a *projection* or *break;* and a part that recedes from him, is termed a *recess.*

When deep semi-circular recesses are made for ornament, they are termed *niches,* for the reception of busts or statues.

To prevent the disagreeable sameness that would arise from the view of the plain and regular surfaces of walls and ceilings, certain ornaments are introduced, which compose or divide the surfaces.

When these dividing parts are formed of curved surfaces and planes, so as to meet in edges, forming straight lines parallel to each other, and to the surfaces which they compart; and, at the same time, the curved parts are portions of cylinders or cylindroids; the surfaces thus formed are termed *mouldings.*

If these mouldings be conceived to be bent round a cylinder or cylindroid, or round a building in either ot these forms, so that the edges of the mouldings may be in planes perpendicular to the axis of the cylindric or cylindroidic surface, they are called circular or elliptic mouldings.

In ordinary cases of modern building, the general position of mouldings upon the walls of edifices, either within or without, are horizontal.

When mouldings are applied to a wall, for the purpose of dividing its surface, the entire should be so constructed that the parts shall not hide each other, unless with the intention to produce a shade.

Every separate part is termed a *member.* Hence, in the same collection of mouldings, those members which are most remote from the horizontal plane, passing through the eye, must be the most remote from the surface of the wall, in order to be seen to the best advantage.

In speaking of the *section of a moulding,* we mean the surface which would arise from cutting it by a plane, perpendicularly to one of its edges.

All edges formed by the angular meeting of anv two surfaces, are called *arrises,* when they terminate external angles.

The plane surfaces, which enter into the combination of mouldings, are generally either parallel or perpendicular to the horizon. When this is not the case, the deviations from this position will be noticed.

In any curved moulding, terminated by two edges, or arrises, that edge which is the most remote from the eye is also most remote from the surface of the wall; except in mouldings of a cylindrical form, which, in general, must be very small when above the eye, as otherwise they will conceal those which are above them. When cylindric mouldings are situated below the eye, semi-cylindric forms are occasionally introduced: these are made so large as to constitute the principal features of the combination, because mouldings in these depressed situations are never so far removed from the eye as to be out of the reach of near inspection.

Hence, to produce the best effect, the situation of mouldings above the eye, the manner in which they are illumined, and even the forms themselves, will differ from the situation, form, &c. of those mouldings which are below the horizontal plane passing through the eye.

The arrangement of mouldings, so as to produce the most striking effect, at the same time that they are completely fit and proportionate to the situation they occupy, forms one of the most interesting studies of the practical architect; and as no precise or particular rules can be laid down, observation, conducted upon the principle of careful comparison, can alone guide to a correct judgment.

Small mouldings of a semi-circular section are called *Beads;* and these are sometimes introduced in a combination of mouldings above the eye, but much oftener below it.

A large semi-circular moulding is termed a *Torus;* its situation is naturally below the eye.

When the form, or section, of a moulding is concave, it is called a *Cavetto;* but below the eye may be either a *Scotia* or *Cavetto,* according as the curvature varies from both its extremes. A convex moulding above the eye is denominated an *Ovolo.* A moulding which has one part concave and another convex, or that which has its section composed of two curves of contrary curvature, is called a *Cymatium,* a term which literally signifies a *wave.* When the concave part of a cymatium is more distant from the horizontal plane of the eye than the convex part, it is called a *Cyma-recta;* but if the contrary be the case, it is styled a *Cyma-reversa.* (See *Plate* I.)

It may be proper to recall to the student's recollection, that, in every moulding above the eye, the upper edge recedes farther from the face of the wall than the lower edge.

Curved Mouldings are always separated from each other by a small member, called a *Fillet.* This member consists of two plane visible surfaces, one perpendicular, and the other parallel, to the horizon.

If one of the intermediate members of a collection of mouldings above the eye consist of a lofty vertical plane, with a considerable projection underneath, either a level or inclined plane, it is called a *Corona, Larmer,* or *Drip.* The use of this member is to throw the water from the lower edge of the vertical surface, without changing its course to that underneath, to protect the lower parts.

Mouldings, which may be generated by planes carried round their axis' in those planes, are called *rotative mouldings.*

Where buildings have a series of mouldings at or near their tops, such series are termed *Cornices.*

Mouldings below the plane passing through the eye, or at the bottom of a building, is called the *Base;* and here we may observe that the part of the building under the base protrudes beyond the surface of the wall above the base.

Any intermediate collection of mouldings is denominated a *moulded string course.*

A series of mouldings placed over the top of each vertical side of a room is termed a *Cornice;* but when the series is situated near the bottom of the room, it is styled a *Base.*

A series of mouldings placed at the springing of an arch, or where each end begins to rise from the vertical surface, is called an *Impost.*

A series of mouldings round a cylindrical arch, having their edges circular, and these edges described from a certain point in the axis of the cylinder, is called an *Archivault.* Or, if the arch be elliptic, with a series of mouldings around it, and if the mouldings have their edges equi-distant from each other, and from the wall, such a collection is also called an *Archivault.*

The surface of a wall is technically denominated the *Naked of the wall.*

A surface parallel to the surface of a wall, and enclosed on all sides by mouldings, is called a *Panel.*

By means of bases, strings, cornices, panels, &c. we may easily conceive that a wall is susceptible of being comparted into very elegant symmetrical forms, and thereby relieving the eye from the sameness of a continuous and unvaried surface.

When the face of a wall is decorated with mouldings, bordering on the margin of an aperture for a door or window, such disposition of moulding is called an *Architrave.*

Mouldings, or solid parts, which protrude towards the spectator, are called by the general name of *projections;* and whatever distance any part is from the wall, that distance is termed the *projection* of that part.

A *Tablet* is a projection, fixed in a wall, with one face parallel to the surface; and the sides of the tablet which connects its face with the surface of the wall, are generally planes perpendicular to that surface. The forms of tablets, though occasionally circular, are generally rectangular. However, they are susceptible of every regular geometrical figure, or combination of figures, symmetrically disposed; that is, so that the parts on the right and left correspond, which should be the case, not only with the subordinate, but also with the several component parts of architectural decorations.

A series of mouldings is said to *return,* when a vertical section of them, parallel to the face of the wall, produces the same forms as a vertical section perpendicular to that face.

When return mouldings do not reach the extent of the wall, or when they extend to a very small distance only, they are said to *profile,* or *terminate, upon the wall;* that is to say, the form

or impression in which the surfaces of the mouldings would intersect the surface of the wall, will be equal and similar to the section of the mouldings on the face or intermediate parts between the returns.

In all insulated buildings, where cornices are employed, they should be carried round the entire edifices; unless, in so doing, it is thought too expensive. But strings, and other collections of horizontal mouldings, are frequently interrupted, even in the lengths of the fronts, by certain vertical projectures which are more prominent.

Horizontal mouldings, placed over the architraves of apertures, and projecting over the extreme parts of the architraves where they terminate on the walls, or over the superior terminating members of the fronts of those architraves, are called the *cornices* of the windows or doors over which they are introduced. And if the architraves be joined to such cornices, the entire are called *architrave cornices,* or *imperfect entablatures.*

Any face of a projection, which is parallel to the surface of the wall, is termed the *front* of that projection.

When any projection exhibits three vertical faces; the middle one, being parallel to the surface of the wall, and the other two perpendicular to it, the two faces which adjoin the wall are called *flanks.* Hence the three faces exhibited are the front and the two flanks.

Here it will be necessary to observe that, when the lengths, breadths, and heights of projections are mentioned, the lengths are measured in horizontal lines parallel to the naked faces of the walls from which they protrude; and the breadths are measured parallel to those faces; consequently the breadths, in the proper sense, is the same as the projecture. Hence we perceive that the greatest extension of a body is not always its length.

When a projection, exhibiting a face and two flanks, is placed between the cornice and the architrave of an aperture, so that each flank may be in the same plane with each side of the architrave, which terminates against the wall, the projection thus described is called a *Frieze.*

The cornice, frieze, and architrave, are collectively termed the *entablature* of the door, window, or other aperture, to which they belong.

In this enumeration we include only the horizontal part of the architrave and not the vertical mouldings belonging to it.

In buildings, upon magnificent scales, projections, similar to the entablatures just described, are carried round the edifices; and where the expenses are limited, along the front only, these projections are also termed *Entablatures.*

But where entablatures of this latter description are executed, it is usual to introduce other equal and similar projections, exhibiting the fronts and flanks; these terminate immediately under the entablatures at the upper extremities, and upon the horizontal surfaces of projections at their lower extremities. The projections thus terminated are called *pilasters.*

Pilasters generally terminate at the top, with mouldings, which return on the sides adjacent to the wall in the same manner as the fronts, which are parallel to them; the mouldings which

thus terminate the upper extremities of the pilasters are called capitals : and very frequently these capitals consist both of mouldings and ornaments.

Occasionally, return mouldings are introduced also at the lower ends of the pilasters; and the mouldings thus situate are called the bases of the pilasters.

The surfaces of pilasters are often ornamented with a series of equal and similar concave mouldings, terminating in vertical edges; mouldings thus introduced are called *Flutes.*

Flutes terminate in different manners at their upper and lower extremities, or where they enter the faces of the pilasters, so as to preserve entire the parts of these faces, whether above or below. But the forms in which they terminate are generally the same as those of their horizontal section, supposing the pilasters to be cut through any intermediate parts of the heights.

In the recess of an internal angle, formed by two planes of a cornice, or even in a string course, a series of equal and similar prismatic solids are sometimes attached to each of those planes, so that every solid may exhibit four entire faces. The solids thus attached are called, according to their forms, *dentils, blocks, mutules, modillions,* or *cantalivers.*

When they are very small and near to one another, so that their heights may exceed their lengths, and also, that the horizontal distances between each and those immediately adjacent may be less than their lengths, they are called *Dentils;* and the cornices are said to be *denticulated.*

If the length of each solid be greater than its height or breadth, the solid is called a *Mutule,* and the cornice itself a *mutule cornice.*

If the distance between each solid exceed twice its length, and if the projecture be from twice to three times the length, each solid is called a *Modillion;* and the cornice thus ornamented a *modillion cornice.*

When the projecture of each solid is more than thrice the length, each solid is called a *Cantaliver;* and the cornice itself a *cantaliver cornice*

CHAPTER III.

PROPORTIONS OF MOULDINGS.

When a room is adorned with an entire entablature, its height may be about one-sixth part of the height of the room; or, in some cases, one-seventh. If a cornice only is executed, its heignt may be about one-twentieth, or one thirtieth part of the height of the room; the proportion depending entirely on the combination, number of mouldings introduced, and their purpose or design. Thus, in the houses of middling classes of people, the cornices may be made light; but, in the houses of the nobility, where grandeur is an object, they should have more massive appearances; and it may be laid down, as a general principle, that all interior decorations and proportions of mouldings must be lighter than those employed in the exterior parts of buildings. The reason of this is obvious; for, in a room, where the eye is confined within a certain distance, and the ornamental parts large, they will naturally appear heavy; but, on the exterior of edifices, the mouldings are viewed with reference to the sizes of the entire buildings, which proportionately diminishes their magnitude; and the advantage of seeing the object at different distances, tends still further to lessen the effect of projectures.

The Greeks appear to have studied and practised this department of the art with the most consummate industry and skill. Many of the mouldings adopted by them were of such massive proportions on the external parts of their buildings, that they were only fitted to be seen from without, and at a considerable distance; in which situation they appeared to the utmost advantage, and produced the most sublime effect: but if viewed from a point near the building, their proportions would have appeared enormous. In order, therefore, to avoid such an unfavourable impression upon the imagination of the beholder, they, in such cases, either painted ornaments upon those members that were of necessity made too large for near inspection, or else they produced the same ornaments in relief, which had the effect of breaking up or dividing a large member into smaller parts; by which means their mouldings were rendered agreeable, when seen from any point, either near or distant.

In the arrangements and proportions of the parts of buildings, they ought to be such as to elevate the pleasures of imagination to the sublime, (which is superlatively explained by a great writer,) to bear the features characteristic of its destination. Grandeur cannot exist without mag-

nitude, both in the entire and in its parts; but a building may be great, and the parts massive, without its being grand. Besides magnitude, a considerable degree of elegance is required to produce grandeur. Sameness of surface, without diversities of figure symmetrically disposed, will not raise any pleasure in the mind. But, when the parts of an edifice follow each other alternately, or repeat a series of symmetrical portions in succession, the combination is easily understood, and the imagination pleased with the uniformity and variety of the compositions.

As a cylinder is a pleasing object, since no two parts of its surface, nor of its circular ends, are alike opposed to the eye; so, in executing a circular building, the terminations ought to be in continued circles. Hence the entablature of such an edifice should not, on any account, be broken; though the intermediate parts of the wall may be decorated with well-proportioned symmetrical parts, as columns, pilasters, or ornamented windows; which, if judiciously introduced, cannot fail to produce the most pleasing effects.

Though definite rules cannot be laid down for the formation and contours of buildings, yet the centre parts ought to assume commanding features, and the grand outlines of the entire should, generally speaking, approach to those of the pyramidal forms.

Lodges, and small houses standing alone, show, with good effect, when their figures approach to the forms of cubes: but, in large mansions, rectangular prisms, with oblong bases, have more pleasing appearances than cubes. The proportions of large buildings may be termed good when the lengths do not exceed the breadths, in greater portions than when they are about four to three.

CHAPTER IV.

SITUATIONS FOR COUNTRY RESIDENCES.

The most essential qualities of good situations are those that are most conducive to health. Where persons intending to build, enjoy the power of fixing upon situations, they should sedulously avoid the proximity of marshes, fens, boggy ground, or stagnant water: and, if rivers are very near, the sites of the houses should be on elevated ground, so as to be out of the reach of unwholesome fogs, which rise from the water at particular periods. In neighbourhoods where the inhabitants are healthful, cheerful, and remarkable for longevity, these may be regarded as possessing salubrious air. Easy accesses to public roads, with supplies for water and fuel, are indispensable requisites in the choice of situations.

Again, it is much better to have a house sheltered by trees than by mountain scenery; because the former yield a cooling and refreshing air, which, during the heat of the summer months, is not only pleasing but animating; and, in winter, they serve, in some degree, to break off the keenness of the blasting winds and tempests: while mountains, according to their position, protect only from certain winds; and if the situations are directly east or south, they will be found extremely unpleasant at particular seasons of the year.

The most favourable soil for building upon will be *gravel*, as water so freely percolates through it, leaving the surface dry and wholesome; whereas *clay* retains moisture, and is always liable to produce damps, that are more or less injurious to health. Nevertheless, when such situations are to be built upon, every care should be taken to raise the foundations as much as possible, and, above all, the utmost attention should be paid to draining, in order to carry off all water from the surface as quick as possible. There is, also, one requisite that is completely indispensable; namely, an adequate and constant supply of water of a wholesome quality: nothing can possibly compensate for the want of that most essential necessary of life.

And with regard to the positions of apartments, such as studies, libraries, dining and drawing rooms, boudoirs, principal and inferior bed-chambers, dressing-rooms, &c., all these should be arranged according to existing circumstances; taking care, if possible, to place the studies or libraries to the north, and the dining and drawing rooms in such places as to avoid too much of the morning and evening sun: and with regard to the residue, such as kitchens, sculleries, &c. they should be situate so as to prevent the fumes of stews and offensive smells from approaching any of the best apartments, yet, at the same time, be so contiguous as not to create unnecessary trouble and labour to servants, whose comforts should be attended to, in order to encourage them to do their duty cheerfully and faithfully, and to the satisfaction and comfort of their employers.

BOOK III.

GOTHIC ARCHITECTURE,

AND ITS PROBABLE ORIGIN.*

TO fix the age of ancient buildings is the first indispensable requisite in the history of architecture, since it is the only way of obtaining a correct view of its progress. But the great number of contradictory hypotheses which have been hitherto advanced on the origin and improvement of ancient architecture in general, and on the churches of the middle age in particular, are evident proofs that to ascertain the age of an ancient edifice is usually attended with considerable difficulties.

On a perusal of the accounts of the erection of ancient buildings, we frequently discover that the assigned period of their foundation does not agree with the style of their architecture, which is either of an earlier or more recent period.

Later writers, who advance assertions upon the authority of others, are worthy of belief only so far as they are able to draw from the right sources, and are endowed with a correct judgment and capable of sound criticism.

In order to judge correctly of the credibility of statements concerning the history of architecture, the buildings to which they refer must not be considered singly, but in connexion with earlier, contemporary, and later works. But, above all, the history of the art is never to be separated from the history of the nation, whose fate it shares alike in its progress and in its decay. Architecture, whose application, more than that of any other art, depends on outward contingences, develops itself slowly and gradually. The creations of the greatest genius are constantly modified by the influence of the time to which he belongs, so that the best and most perfect work can only be considered as the result of the progressive improvement of several generations: and an accurate comparison of a series of architectural works, combined with a diligent study of history, points out the only safe road on which the developement of the different styles of architecture is to be pursued. After the principal periods of the improvement of the art have thus been carefully and critically fixed, a proper place is more easily assigned to some special, though anomalous works.

With regard to the names of the several styles of architecture which appeared in Europe

* This article was selected and arranged for this work by Mr. W. B. Clarke, chiefly from Mr. Moller's valuable Treatise on Gothic Architecture.

after the decay of Roman Architecture, and continued till the sixteenth century, when they were superseded by the modern Græco-Roman art, they were all for a long time comprised under the general name of Gothic Architecture. This epithet was afterwards applied to the pointed arch style, which predominated in the thirteenth century. At present, it is well known that the appellation of Gothic Architecture is not a suitable one: but those of Byzantine, Saxon, and German Architecture, by which it has been attempted to supersede it, are neither generally received, nor sufficiently distinct.

In respect, however, of the question, to whom the merit of the invention and the improvement of the art is to be ascribed, the following more architectural than historical observations may perhaps be of some importance in the inquiry.

The forms of buildings are far from being arbitrary and accidental in their origin. The climate, the building materials, and the character of the nation, exercise a very essential influence on them, and cause those diversified appearances which vary as much as the physiognomy of countries and the situation of nations. Whatever is produced by these causes is singular in its kind and in harmony with itself. Every species of architecture, on the contrary, which, owing its origin to foreign nations, to a different climate and different circumstances, is transferred to other people and other countries, retains the character of unsuitableness and unconnectedness, until some artist of eminent talents successfully appropriates it to his own use, and forms out of it a new, national, and consistent style of building. If this be admitted, that nation undoubtedly has the merit of a particular style of architecture, whose edifices—

1st. Correspond with the climate, with the style of construction adapted to the materials, and with the sentiments and manners of the nation and of the times, and

2dly. Constitute in their principal forms, and in their several parts and ornaments, a whole in harmony with itself, which excludes or rejects every thing foreign or unsuitable.

According to different hypotheses the invention of the pointed arch style of building is derived—

1st. From the holy groves or thickets of the ancient Celtic nations.

2dly. From huts made with the entwined twigs of trees.

3dly. From the structure of the framing in wooden buildings.

4thly. From the pyramids of Egypt.

5thly. From the imitation of pointed arches generated by the intersection of semicircles.

The first opinion, according to which the slender pillars and bold vaults of the churches of the thirteenth century are supposed to be an imitation of the holy groves or thickets in which the ancient Celtic nations worshipped the divinity, is ingenious and pleasing, but has no historical foundation. The most ancient churches have no trace of this similarity; it is only in the fourteenth and fifteenth century, consequently seven hundred years after the old religion of the country had ceased, that the introduction of vaults entwined with ribs, which have been compared to twigs of trees, had existence.

The second hypothesis, according to which this style of building is supposed to be an imitation of huts, made with the entwined twigs of trees, and which Sir James Hall, endeavoured to support with many examples, is not better founded, and inadmissible on the grounds before stated. It is only the latest and corrupt buildings of the fifteenth and sixteenth century that display this imitation of twigs.

The third hypothesis supposes that the structure of the timber-work in wooden buildings was the origin of the pointed arch style. An attentive examination of the buildings of the thirteenth century, shows that the ancient style of church building pre-supposes above all the art of erecting vaults, and is, therefore, grounded entirely on stone constructions. But the later pointed arch style is derived from that more ancient style of architecture, and although its forms differ from those of the latter, yet they all refer to the vault and arch. Stone, therefore, is likewise, with this style of building, the materials used in the construction of churches, and it was merely the framing of the roofs which was of wood, and the workmanship of the carpenter. The old timber dwelling or guild-houses of the fifteenth or sixteenth century, bear no resemblance to the style of church building of the middle age; their forms, on the contrary, are very suitably and intelligently adapted to structures of carpentry. It is the principal advantage of a consistent and improved style of architecture, that the forms of buildings and of their separate parts should be conformable to the building materials used in their construction, and that wood is not to represent freestone, nor freestone wood.

Mr. Murphy, the editor of the celebrated work on the convent of Batalha, in Portugal, and the buildings of the Moors in Spain, derives the pointed arch style from the pyramids of Egypt, and argues in this manner: "the pyramids of the Egyptians are tombs; the dead are buried in churches, and on their towers are pyramidal forms; consequently, the pyramids of the towers indicate that there are graves in the churches, and as the pyramidal form constitutes the essence of the pointed arch style, and the pyramids of the towers are imitations of the Egyptian pyramids, the pointed arch is derived from the latter." But the burying of the dead in churches was a mere secondary, subordinate object, not their principal destination. Hence it could not be the intention to designate churches on their outside as tombs; and the most ancient churches, and those of the south, rarely have pointed steeples: their towers generally end in roofs of very little or no elevation. Neither are the tombs of the middle age in the form of pyramids or obelisks; this ornament, on the contrary, is very modern. The points of towers are nothing but a high roof, and whenever the church had such a roof, it could not be omitted in the higher tower; an imitation of the Egyptian pyramid, therefore, is entirely out of the question.

The fifth hypothesis is that of Mr. Milner, to whom we are indebted for several valuable works on the architecture of the middle age. After ably refuting, with much learning and sound criticism, several hypotheses of other writers, he fancies he discovers the origin of the pointed arch style, and of the architecture of the middle age in general, in an imitation of the intersecting semicircular arches used as ornaments in the ancient English style of building. But this expla-

nation, likewise, appears unsatisfactory. The question is not, who invented the pointed arch; this, like every other mathematical figure, had long been known.* The only question is, how this pointed arch happened to prevail in the style of building of the thirteenth century. Ornaments, as unessential parts, are conformable in every style of building to the essential main parts of buildings: but never are the main parts conformable *vice versâ* to the ornaments. It is not to be supposed that all the highly characteristic forms of a style of building, which was so generally diffused and so consistently contrived, should have been borrowed from an accidental and unessential decoration of the cornices. Experience, also, is in our favour, since we observe, in all the buildings of the time in which the older style of building passed over to the pointed arch style, how changes were first introduced in the main forms, gables, and roofs, and later in the vaults and windows, and still later in the unessential parts and ornaments.

The foregoing observations show the groundlessness of the several hypotheses mentioned; but the solution of the question, whether the pointed arch style belongs to one single nation exclusively, and to which, is attended with greater difficulties. If the hypotheses on the origin of the pointed arch style are various, opinions are not less divided on the present question; and the invention of this style has been ascribed to the Goths, the Lombards, the Saracens or Arabs, to the Spaniards, the Italians, the French, the Germans, and the English.

The art cannot be ascribed, as Tiraboschi seems to do, to the Goths, who, as warlike nomades, only invaded Italy in Theodoric's time, and to whose reign Narses, the general of the Greek empire, had put an end in the year 552, their sway having lasted only fifty-nine years.

The same remark will apply here which was made above, respecting the edifices built under the sway of the Goths. The Lombards, a rude invading people, adopted the civilized manners of the conquered, as well as their architecture. Considering the very imperfect knowledge of which we are hitherto in possession, of the style of building of the Lombards, it is certainly erroneous to ascribe to them, as but late has been done, even down to the eleventh century, and after they had already left the scene for three hundred years, any material influence upon the architecture of the west and north of Europe. Still more erroneous is it to give the appellation of Lombardic to the style of church building which prevailed in France and Germany during the middle ages.

The Arabs, who appeared as conquerors from the year of our Lord 610, and who, besides the countries which they conquered in Asia and Africa, possessed themselves in the year 713 of the greatest part of Spain and Portugal, erected in the latter countries some very considerable buildings, which are partly yet existing, and impress us with high notions of their knowledge of the arts, and of their magnificence. But a careful examination of their buildings, shows that there is nothing in them that has the most distant resemblance to what is called the Gothic style.

In the Arabian buildings, the arches are in the shape of a horse-shoe, the columns are all low and stand singly, the windows are small, the roofs flat, and the horizontal is the prevailing form in the whole composition of their buildings. In the ancient churches of the thirteenth century, the

* In the ruins of the city of Tusculum is to be seen a perfect pointed arch.

arches, on the contrary, are pointed, the pillars high, and composed of several columns, the windows large, and the roofs and gables high. The more the two styles of buildings are compared, the more one is astonished that the Arabs could ever have been thought of, as the inventors of a style of building so different from their own. It is true that many Arabian capitals, whose form is square at the top and joins the round column below, bear some resemblance to many capitals in the buildings of the middle age; but columns are also met with in Arabian buildings with Corinthian and Roman capitals, and yet we do not regard these as an invention of the Arabs. These occurrences are easily explained, when we consider that the Arabs, originally a nation of herdsmen, could not have any architecture whatever; and that it was only after they became stationary in the countries which they had conquered, and from nomades* became an agricultural people, that they formed a particular style of building for themselves. And as all the new possessions of the Arabs had formerly belonged to the vast Roman empire, it is very easy to conceive that they must have adopted in their style of building much that is found in the structures of the earlier or later Christian Roman times.

Which of the people of Europe first introduced or improved the pointed arch style is not easy to ascertain, for we find this style of building almost contemporary in all parts of Europe. A comparison of the churches built in different countries will facilitate the solution, if we attend to the following, according to which that style of building alone can lay claim to be national, which, in its forms, corresponds with the climate and building materials of the country and constitutes at the same time a consistent, intelligent whole, excluding every thing heterogeneous.

The cathedral of Orvieto in Italy, which is supposed to be the work of Nicholas of Pisa, who lived about the year 1240, has throughout, with exception of that in the front, rose windows, and exhibits in the front the style of building employed in the thirteenth century. But behind the pointed gables of the front there are flat roofs, so that the gables stand quite free above them. A glance at the dwelling-houses of that town shows that flat roofs are indigenous to Italy; and we may therefore justly conclude that the whole system of building which has high gables is foreign there, and comes from a northern country.

And just as the high gables on the flat Italian roofs belong to a northern country, so the flat gable on the high German roof has evidently been transplanted into Germany from a southern country. The church of Batalha, in Portugal, affords another instance of the use of the pointed arch style of southern countries. The roof of the church is quite flat, covered with large stone slabs, and suitable to the climate: the whole form of the building, the pyramids, and the small pointed gables with which the aspiring pillars are ornamented, are, however, discordant with the horizontal termination of the nave of the church, and clearly show that the high gable roof is essential in this style of building, and that, consequently, its origin can be sought for in a northern climate only.

* Nomades, a name given in antiquity to several nations, or people, whose whole occupation was to feed and tend their flocks, and who had no fixed place of abode, but were constantly shifting, according to the convenience of pasturage.

It will be here necessary to endeavour to show, ***that the pointed arch style of the thirteenth century arose out of the most ancient Christian Roman style.***

But to form a correct notion of this style of architecture we must consider the forms of earlier buildings.

The edifices of Egypt are distinguished by their uncommon durability, they have no inclined roofs, their covering consists of very large and thick stone slabs, disposed horizontally; and the strength of their columns, their proximity, as well as the horizontal direction of the roofs and openings, are natural consequences of this kind of construction.

The Grecian buildings, which also are very durable, display moreover the most beautiful proportions. They had timber roofs, covered with tiles of burnt clay, or of marble. Large edifices had flat timber coverings, but smaller ones, like the outward colonnades, were covered with stone, hence the Grecian columns, which, when compared to the Egyptian, have no heavy burthen to support, are more slender than the latter. The want of timber coverings, and the necessity of employing large stone masses, is the cause, in the Egyptian architecture, of the horizontal covering of the inner rooms and colonnades, as well as of the doors and windows.

Vaulted roofs and arched doors and windows were not in use. Both the Egyptian and Grecian edifices, whilst they are suitable to the climate, the building materials at hand, and the purposes for which they were erected, possess at the same time the greatest harmony in their forms, and are free from inconsistency and disagreement.

Colonies of Greeks diffused civilization through lower Italy. The temples of Pæstum, in Magna Grecia, belong to the best works of Grecian architecture. This species of art flourished also at Rome; but, whatever was the beauty of the plan, and of the construction of the buildings peculiar to the Romans; of their Basilicæ, their amphitheatres, bridges, aqueducts, streets, and baths, yet the Roman temples, which are imitations of the Grecian edifices, though more splendid and more extensive, have not that simplicity of form, nor that purity of style, which characterise the Grecian buildings.

The Hetrurians, in Middle Italy, judging of them by their works, were a highly civilized people. They practised architecture with the most distinguished success, and, like the Egyptians and Greeks, they were not only acquainted with the art of constructing buildings of large blocks of freestone, without the aid of mortar, but also erected the most durable vaults.*

The Romans, situated in the centre between Magna Grecia and Hetruria, and more addicted to war than to the arts, adopted both the Grecian and Hetrurian architecture, and employed both vaults and colonnades in their buildings.

The remains of Mecænas' Villa, at Tivoli, the Pantheon, and many similar works, excite astonishment by their magnitude, and delight the beholder by their extent, and the ingenious construction of the large vaulted roofs which have been preserved unimpaired. To harmonize with the vaulted roofs, whenever they occurred, the opening of doors and windows were likewise

* Cloaca Maxima.

provided with vaulted or arched coverings; but columns, unable to support the pressure of large vaultings, lost, through the introduction of the latter, their principal destination.

Having been retained as ornaments in vaulted buildings, they were employed in situations disengaged from the walls, as in the interior of the Pantheon, or half engaged with the walls, as in Mecænas' Villa, in the theatre of Marcellus, and in the Coliseum.

This combination of vaults with columns and horizontal architraves, parts totally heterogeneous at their origin, affords, in the opinion of Mr. Möller, a very simple solution of the riddle, which the specimens of later Roman and Byzantine architecture, as well as those of the middle age, up to the latter half of the twelfth century, offer throughout the different countries of Europe by the frequent want of harmony in their forms and construction. To solve these a number of hypotheses have been invented. If, as in the Temple of Peace, an enormous vaulted roof could, though but in appearance, be supported on columns and their friezes, there was no reason why, in smaller distances, they might not likewise be connected with arches, instead of horizontal architraves.

And as columns were already, in most cases, considered as mere decorations, requisite for effect, and might be omitted without prejudice to the stability of the building, the Romans did not scruple to introduce them in the places where they were to serve merely as ornaments without any apparent object. In this stage of decline was the Roman architecture (anterior to the invasion of the barbarians) under Diocletian, the last emperor before the introduction of the Christian religion.

In the baths of this monarch, at Rome, we find large groined vaults and columns, counterpoised by flying buttresses in the exterior, which were subsequently so much improved in larger churches.

In his palace at Spalatro, the colonnades of the court-yards are connected by means of arches resting directly on the columns; and over the Porta Aurea, the principal entrance of the palace, there are rows of columns also connected by arches, as decorations. All this tends to show that the decline of the empire was also attended with the decay of the arts; and that this decay was brought on by the Romans themselves, a long time before the invasion of foreign nations.

When Constantine removed the seat of the Roman empire to Byzantium, and Christianity became the only religion of the state, it seemed likely that architecture should have derived a new splendour from the extensive buildings which the emperors erected to embellish their new residence. The decay of the arts and the decline of the general prosperity, introduced, after Constantine's time, the custom of pulling down old buildings to erect new ones with their materials.

It is evident that the columns and parts of the old buildings, thus applied, could not possibly suit the new edifices. A total neglect of exact proportions was the natural consequence of this ruinous practice.

The style of building probably underwent less alteration in dwelling-houses and strong holds, or fortresses, on which the existence of empires depended in those times more than in ours. The walls and towers of the palace at Spalatro, and many other edifices of that period, still manifest considerable stability: and the frequent tottering empire of the east was often indebted for its

preservation during the eleventh century to the solidity and height of the towers and walls of Byzantium.

But the style of building in edifices for public worship was much more extensively altered. The temples, which, at their origin, had never been destined to receive large congregations in their interior, were either not sufficiently roomy to serve as churches, or they were at first regarded as having been profaned by the worship of the heathen gods.

Their place was supplied by basilicæ, partly with flat timber roofs, as was generally the case, and partly vaulted.

Churches were rarely built on a circular or polygonal plan, after the model of the Pantheon or of the Temple of Minerva Medica.

The want, in these round churches, of a chancel, of vaulted aisles on each side of the nave, and of a portico, frequently induced the architect to erect in the middle of the building four transepts, of equal dimensions, in the shape of a Greek cross, which style of building appears to have been in great favour, particularly in the Greek empire.

The practice of filling the voids of large and small arched openings with columns, which though they do not contribute to the solidity of the building, yet seem essential supporters, and frequently give the whole a light, and at the same time a rich appearance, was introduced by the Byzantines.

The first example of it is found, however, in the Pantheon at Rome. This practice is particularly characteristic, and appears of great importance in the architecture of the following centuries.

All the buildings which, from Constantine down to the ninth century, were erected within the limits of the former Roman empire, bear witness to the corrupted Roman architecture of Diocletian's age, with the additional alterations which the use of churches, the custom of building with old materials, and the continually sinking state of the empire and of the nation, necessarily introduced.

The irruptions of the Goths, and other barbarians, who inundated the provinces of the Roman empire, did not probably introduce any material alteration in the state of the art, except that of hastening its fall. Mr. Möller says, in continuation, I cannot possibly accede to the opinions of those connoisseurs who ascribe an individual and peculiar style of architecture to the Goths and Lombards in Italy and Spain, to the Franks in Gaul, and to the Saxons in England. On examining their works, it will be found that the Roman architecture of the fifth and sixth century, with some few modifications, prevailed in these countries, and the circumstance is easily explained.

The conquerors did not exterminate the old inhabitants, but left them exclusively, at least in the first periods of their invasion, the practice of those arts of peace, upon which the rude warrior looked with contempt. And even at a later period, the intimate connection with Rome, which the clergy, then the only civilized part of the nation, entertained, and the unceasing use of the Latin

language in the divine service gave considerable influence to Roman arts and sciences. This must have been so much the more the case, from the constant obligation of all free men to devote themselves to war, whereby the practice of the arts was left almost exclusively to the clergy.

The taste for fine proportions was almost entirely lost in these barbarous ages, and architecture became little less than a slavish imitation of earlier forms; yet it appears that the art of preparing mortar, and the selection of building materials, as well as the knowledge of solid construction in their structures, for which the ancient Romans were so eminent, were fortunately preserved.

Prior to the sway of the Romans in Germany, and in those parts which they did not occupy, architecture was undoubtedly very rude. Although the want of precise information leaves us in uncertainty about its state; yet the picture which Tacitus draws of the Germans of his time, shows how little they cultivated the arts in general. The southern provinces, however, being governed and reclaimed by the Romans, received an earlier and more extensive civilization, and Roman Architecture flourished there, as is evident from the numerous remains of buildings of that period.

When Christianity prevailed in the Roman empire, churches also were erected in Germany, as appears from ancient documents, especially in Austria, Bavaria, and on the Rhine. The cathedral of Aix-la-Chapelle, and the portico of the ancient convent of Lorsch, near Worms, are, as near as can be judged, the only buildings of the time of Charlemagne extant in Germany. The latter is in a very corrupt Roman style. .... If, therefore, these and the foregoing observations be admitted, we shall be obliged to look for the origin of Gothic, or the pointed arch style, in a country which has a northern climate; consequently, in the north of France, in England, or in Germany. The French churches of the middle ages, some of which are considerable, are but little known by drawings; we, therefore, can refer here only to the cathedral of Paris. The main form of the front gate, which is said to have been built in the reign of king Philip Augustus, has, upon the whole, no high aspiring proportions: on the contrary, the horizontal line which prevails in the composition, and the flat roofs of the towers, correspond infinitely more with the ancient christian Roman style, than with the architecture of the middle age, from which the details alone of the ornaments appear to be borrowed. Among the more ancient English churches, none is more celebrated than York Minster, which was built towards the latter end of the thirteenth, and in the beginning of the fourteenth century. As the English lay such positive claims to the merit of having invented and improved the pointed arch style of the thirteenth century, a closer examination of this church will not be deemed superfluous. Its main forms, the low gable roof, and the flat towers, evidently belong to a southern style of building. The whole ornamental system, on the contrary, is of northern origin, and stands in evident contradiction to these leading forms. The pointed gable, which crowns the middle window, and is repeated in all the ornaments of the edifice, does not harmonize with the flat gables of the roof. The flat roofs of the towers correspond as little with the other parts of the building; they should, necessarily, have terminated in pyramids, as all the smaller towers of the aspiring pillars have the pyramidal form. All this shows the incongruous

combination of two completely heterogeneous styles of building, and prejudices us so much the less in behalf of the originality of the English ecclesiastical architecture, as, at the time when the York Minster was built, the German churches already displayed the completest developement of the art.

Lastly, let us examine the German style of church building, and particularly the Minsters of Strasburg and Freiburg, and the church at Oppenheim, which were all built in the second half of the thirteenth, and in the beginning of the fourteenth century. The main forms, as well as the whole system of their ornaments, are in perfect harmony in these churches, and rest upon the pointed gable, the pyramid, and the pointed arch. The smaller tower, which crowns the aspiring pillars, displays, in the manner in which it is filled up, the form of the ornamented windows. Above these, the pointed gables, and then the pyramid; and thus it repeats, on a small scale, the figure of the whole; a similar harmony of form reigns in all the best German churches from the thirteenth to the fifteenth century.

On comparing the ancient churches of Germany with each other, we discover in their style of building two leading differences, all others being mere gradations or combinations of them. The first and earliest is foreign, and came from the south; it is by no means rude, having been originally a highly finished style of building; but latterly became degenerated. The buildings of this kind are distinguished by forms and decorations, either Roman, or imitated from the Roman, but especially by flat, or at least not very high roofs, by semi-circular arches and vaults, and by the great solidity of their construction. The second and most modern style of building still retains the semi-circle, but begins to substitute for the southern flat gable end, that of the high roofed, which is more suitable for a northern climate. To harmonize with the shape of the roof, the forms of the towers are pyramidal, and the windows and the vaults in the pointed arch style, whilst all the minor ornaments still preserve the semi-circular form. It was only at a later period that the decorations, and all the minor and subordinate parts of the main building, assumed the shape of the pointed arch.

Of this latter style, are the grandest work of architecture which Germany possesses, works which will remain an object of admiration for ages to come. These are the chief features in the church architecture of Germany, observable in ancient buildings. They show how a northern peculiar style was gradually formed out of the southern foreign one, and they are by no means in contradiction to history, although we are still ignorant of the many causes which may have influenced the improvement in the art.

In the tenth and eleventh century, several important churches were built in Germany, as the cathedrals of Spire, Worms,* Mentz, and many others, which are still in existence, and astonish us by their solidity and magnificence.

The leading form of these churches, as of those which were built at the same period in

* The Cathedral of Worms was commenced in the year 996, and consecrated in 1016: it is one of the most ancient churches in Germany, and is of such importance, that it might be made the object of a separate and instructive work.

England,* France, and Italy, is in imitation of the basilicæ, a long parellelogram, with side naves, a strongly marked cross nave, which represents the arms of the cross, on whose intersection there is frequently a louvre. The chancel ends with a semi-circle on the plan, and the whole has very thick walls, with comparatively small openings, and without any tall or aspiring pillars. In the drawings of these buildings, we find in all the gates, windows, and arched aisles, the pure semi-circle. The nave is high; the covering frequently consists of groined vaulting, but raised in the shape of cupolas, and often with flat timber coverings; on the exterior, the gable is usually of little inclination, and in the upper part of the building there are rows of small pillars in the wall.

The horizontal line still predominates generally on the whole exterior, contrary to the building of the thirteenth century, in which all the parts of the building seem to aim at rising still higher. The profiles of the parts and ornaments are almost all, without exception, of antique origin; and several, as, for instance, the continually recurring attic base, are perfectly correct in their forms. The difference between these German churches, and the Roman basilicæ, consists in the almost general covering of the interior with vaulting. The consequence of this was, that it became necessary to substitute piers for the isolated columns which supported the flat wooden roofs, and which were too weak to bear vaults, or to connect the piers with the columns. Although the columns which were introduced as ornaments of the piers, were originally in imitation of the Roman series of arches, they were soon justly altered. The isolated column was proportioned to its height, and to the load which it was intended to carry. Towards the latter end of the twelfth, and in the beginning of the thirteenth century, important deviations from this ancient style of church building were introduced. The high northern roof took the place of the flat southern gable;† and the introduction of this high pitched gable brought along with it the use of the pointed arch, instead of the semi-circular one, in order to introduce more harmony with the other parts of the buildings.

When the roof and vaults where thus raised, it was proper that the inferior part of the building should also receive a comparatively greater height: hence, all the proportions of the columns, capitals, vaults, towers, &c. became more slender towards the latter end of the century, and the flat pilaster spreads more outwards, and rises as a flying buttress. After all the essential parts of the building had thus been altered in their forms and proportions, the details and decorations of the earlier style of building were yet retained for some time. The edifices of this period, though possessed of many beauties, are yet full of anomalies. Circular and pointed arches, rising pillars and vaults, intersected by horizontal cornices, form the most disagreeable combinations. The crisis which marks every transition into another state, and which throughout nature in general is momentarily discordant and disagreeable, bears visibly the same character here. This,

* This style is in England denominated Norman.

† In the portico at Lorsch, and in the convent church at Ilbenstadt, the original low gable was still to be recognized, upon which a higher gable had been placed at a later period.

heterogeneous combination of the ancient southern style of building with the new one, which in the main, agreed better with the climate, lasted but a short time.

In the year 1235, when the church of the Teutonic order of knights was begun at Marburg, and soon after finished in the same style up to the western gate or porch, the alteration of this style of building seems to have been perfectly accomplished. The high gable and the pointed arch prevail throughout, and each individual part is in perfect harmony with the whole. This church, besides being constructed and finished in a masterly, skilful, and workmanlike manner, is distinguished by the greatest simplicity and elegance, the happy combination of which is not easily met with in such perfection. After this appropriate, peculiar, and rational style of building, which in its leading forms correspond with the climate and building materials, and, in its parts, with the whole, had been thus improved, we behold it quickly brought to the highest perfection, in many admirable architectural works. As early as the year 1248 they began to build the cathedral of Cologne upon its present plan; and, in the year 1276, the porch of the Minster at Strasburg, under the direction of Erwin von Steinbach, two structures, which, though unfinished, will be the admiration of all ages, from the boldness of their design, the beauty and elegance of their parts, and the excellence of their execution. This new style of building prevailed almost at the same time in all the countries of Europe; and we find its influence upon all the churches built in this and the following century.

Very few Greeks and Romans (observes Mr. Möller) have carried technical ability and a strictly correct calculation of the proportions between strength and burthen, so far as the architects of the thirteenth century. The boldness and lightness of their structures will long continue unrivalled. Not only were the buildings of these great masters erected with the smallest possible expenditure of building materials, and are still in excellent condition, but the arrangement of the whole, and the proportion of the parts also are so well calculated that their edifices appear much larger than they are in reality, which is exactly the reverse with most of the works built in the antique style, and particularly with St. Peter's church. As the greatest art consists in producing the grandest effects with the smallest means, the churches of the thirteenth century are, in this respect, highly instructive to the thinking artist.

The great impression which these churches, particularly their interior, make upon the mind of every unprejudiced person,—on that of the intelligent and well-informed, as well as that of the uncultivated and ignorant,—is truly wonderful: they combine the simplicity and majesty of the groves of the forest, with the richness and beauty of its flowers and leaves; all its variety, greatness, and sublimity. The golden age of this style continues from the middle of the thirteenth to the latter end of the fourteenth century. The desire to produce something new and still more beautiful, as it had caused the decline of the ancient Roman, and afterwards, in the seventeenth century, that of the Italian style of architecture, occasioned likewise the decay of the Gothic style of church building. To a severe regularity of forms, succeeded arbitrary petty decorations; and whereas the best examples of the thirteenth century are ornamented with fruits

and flowers, the edifices of the fifteenth were themselves frequently in the form of plants, a freak which seems to overstep the bounds of architecture. This style of building, having outlived its prosperity, was the more easily superseded in the sixteenth century by a more modern Italian style.

Although it is evidently shewn from this treatise of Mr. Möller, that the English cannot claim the merit of being the sole inventors of the style of architecture, called Gothic, yet, nevertheless, this style has been more extensively practised, and has become more varied in its forms, in England, than either in Italy, France, or Germany, and may be said to be the national architecture of this country. Mr. Rickman, in his work on Gothic Architecture, viewing it as national, has called it English Architecture, and has divided it into four distinct periods or styles, called Norman, Early English, Decorated English, and Perpendicular English.*

" The Norman style, according to Mr. Rickman, prevailed to the end of the reign of Henry II. in 1189, distinguished by its arches being generally semi-circular, though sometimes pointed, with bold and rude ornaments. This style seems to have commenced before the conquest, but we have no remains really known to be more than a very few years older."

" The Early English style, reaching to the end of the reign of Edward I. in 1307, is distinguished by pointed arches, and long narrow windows, without mullions and a peculiar ornament, which, from its resemblance to the teeth of a shark, is called the toothed ornament."

" Decorated English, reaching to the end of the reign of Edward III., in 1377, and perhaps from ten to fifteen years longer. This style is distinguished by its large windows, which have pointed arches, divided by mullions, and the tracery in flowing lines, forming circles, arches, and other figures, not running perpendicularly; its ornaments are numerous and very delicately carved."

" Perpendicular English. This is the last style, and appears to have been in use, though much debased, even as late as the year 1640, but only in additions; probably the latest whole building is not later than Henry VII. The name clearly designates this style, for the mullions of the windows, and the ornamented panellings, run in perpendicular lines, and form a complete distinction from the last style; and many buildings are so crowded with ornaments, as to destroy the beauty of the design. The carvings are generally very delicately executed."

The debased perpendicular style is most evident in the domestic buildings of the reign of Elizabeth. The architecture of this period was mixed, for the first time, with the architecture of Italy. This style is generally known by the name of Elizabethan architecture. In the reign of James the First, Italian architecture was introduced by Inigo Jones, and the study of Gothic architecture was neglected; nor was the taste revived until the reign of the late sovereign, George the Fourth.

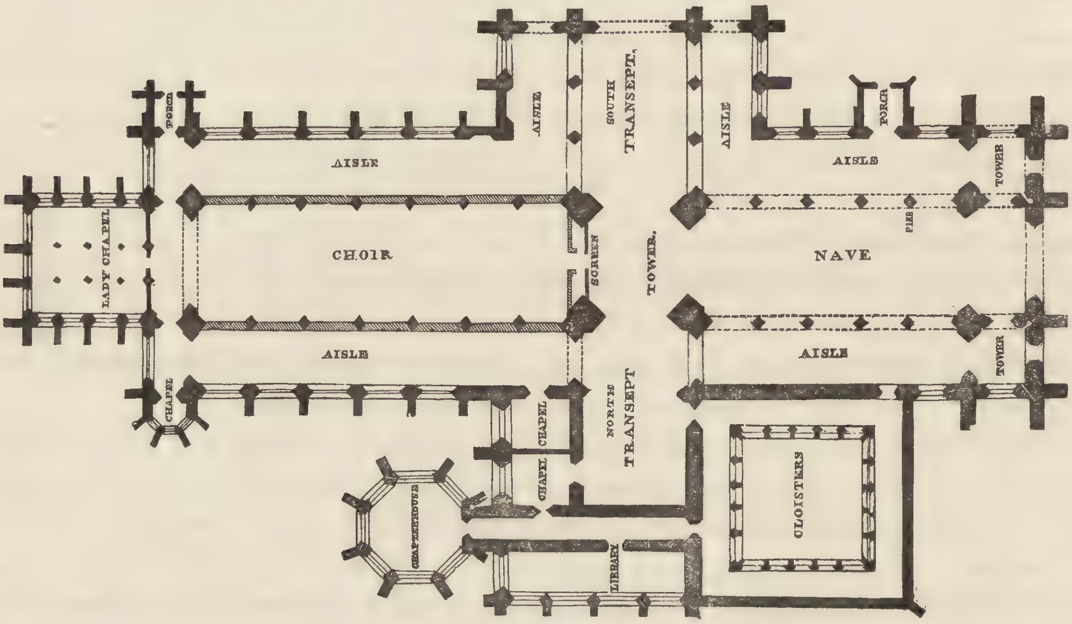
We will here quote from Mr. Rickman† the following terms, which are employed in describing the churches and other buildings which exemplify the styles.

* Rickman, p. 39.

† Rickman's "Attempt to discriminate the Styles of English Architecture," p. 39.

He observes that, "Most of the ancient ecclesiastical edifices, when considered complete, were built in the form of a cross, with a tower, lantern, or spire, erected at the intersection. The interior space was usually thus divided:—

PLAN OF A CATHEDRAL.



" The space westward of the cross is called the *nave.*

" The space eastward of the cross is generally called the *choir.*

" The divisions outward of the piers, the *aisles.*

" The part running north and south is called the *transept.*

" The choir is generally enclosed by a *screen,* on the western part of which is usually the organ.

" The choir, in cathedrals, does not generally extend to the eastern end of the building, but there is a space behind the altar, usually called the *lady chapel.*

" The choir consists only of that part between the piers, and does not include the side aisles, which serve as passages to the lady chapel, altar, &c.

" The transept has sometimes *side aisles,* which are often separated by screens for chapels.

" *Chapels* are attached to all parts, and are frequently additions. The aisles of the nave open into it, and in cathedrals both are generally without pews.

" In churches, not collegiate, the eastern space about the altar is called the *chancel.*

" To the sides are often attached small buildings over the doors, called *porches,* which have sometimes vestries, schools, &c. over them.

" The *font* is generally placed in the western part of the nave, but, in small churches, its situation is very various. In a few churches, a building like a chapel has been erected over the font, or the font set in it.

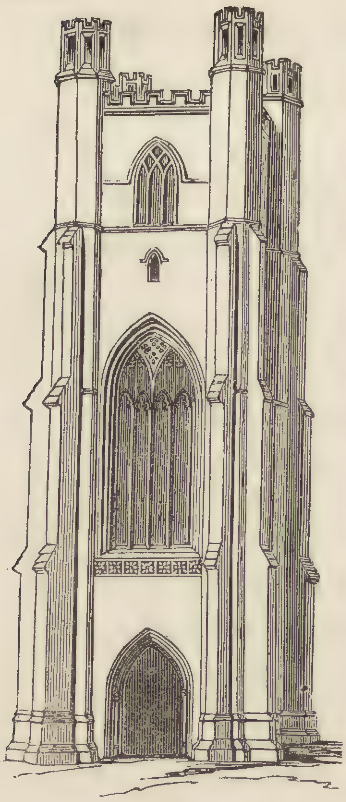
"In large churches, the great doors are generally either at the west end, or at the end oı the transepts, or both; but in small churches often at the sides.

"To most cathedrals are attached a *chapter-house* and *cloisters,* which are usually on the same side. The *chapter-house* is often multangular. The *cloisters* are generally a quadrangle, with an open space in the centre, the sides to which are a series of arches, originally often glazed, now mostly open. The other wall is generally one side of the church, or other building, with which the cloisters communicate by various doors. The cloisters are usually arched over, and formed the principal communication between the different parts of the monastery; most of the large cross churches having been monasteries.

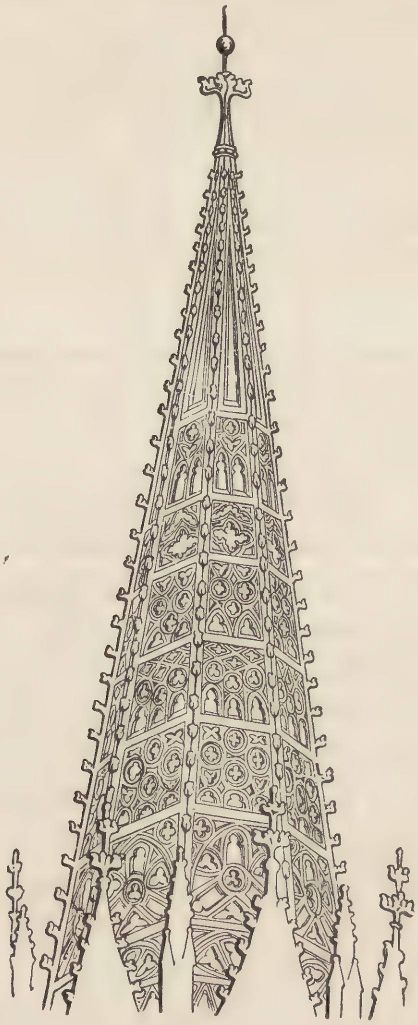
"The lady chapel is not always at the east end of the choir: at Durham it is at the west end of the nave; at Ely, on the north side.

"The choir sometimes advances westward of the cross, as at Westminster. The spaces in the interior, between the arches, are *piers.*

"Any building above the roof may be called a *steeple;* if it be square topped it is called a *tower.*



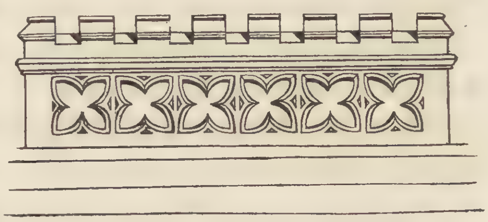
Tower.



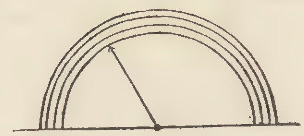
Spire.

" A tower may be round, square, or multangular. The tower is often crowned with a spire, and sometimes with a short tower of light work, which is called a *lantern.* An opening into the tower, in the interior, above the roof, is also called a lantern. Towers of great height in proportion to their diameter are called *turrets:* these often contain staircases, and are sometimes crowned with small spires. Large towers have often turrets at their corners, and often one larger than the others, containing a staircase; sometimes they have only that one.

" The projections at the corners and between the windows are called *buttresses;* and the mouldings and slopes which divide them into stages, are called *set-offs.*



" The walls are crowned by a *parapet,* which is straight at the top, or a *battlement,* which is indented; both may be plain, or sunk panelled, or pierced. In castellated work, the battlement sometimes projects, with intervals, for the purpose of discharging missiles on the heads of assailants: these openings are called *machicolations.*

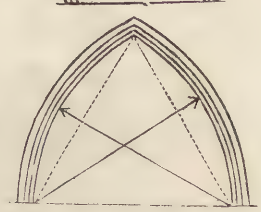


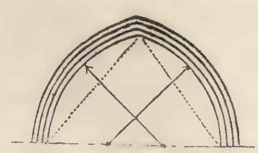
" Arches used in Gothic buildings are round, pointed, or mixed.

" A *semi-circular arch* has its centre in the same horizontal line from which it springs.

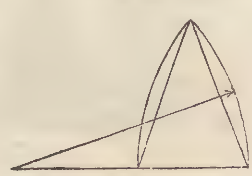
" A *segmental arch* has its centre lower than the springing line.

" A *horse-shoe arch* has its centre above the springing line.

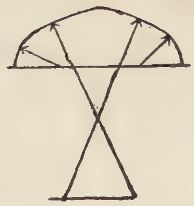




" *Pointed arches* are either *equilateral,*—described from two centres, which are the whole breadth of the arch from each other, and form the arch about an equilateral triangle; or *drop arches,* which have a radius shorter than the breadth of the arch, and are described about a triangle having its angles less acute than an equilateral triangle; or *lancet arches,* which have a radius longer than the breadth of the arch, and are described about an acute angled triangle.



" All these pointed arches may be of the nature of segmental arches, and have their centres below their springing line.



"*Mixed arches* have four centres; that which is commonly called the *Tudor arch,* is flat for its span, and has two of its centres in or near the springing line, and the other two on a parallel line far below it.

"The *ogee,* or *contrasted arch,* has four centres, two in the springing line, and two in a parallel line above it and reversed.

"The spaces included between the arch and a square formed at the outside of it are called *spandrels,* and are often ornamented.

"Windows are divided into lights by *mullions.*

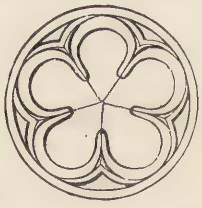
"The ornaments of the divisions at the heads of windows, &c. are called *tracery.* Tracery is either *flowing,* where the lines branch out into the resemblance of leaves, arches, and other figures; or *perpendicular,* where the mullions are continued through in straight lines.

"The horizontal divisions of windows and panellings are called *transoms.*

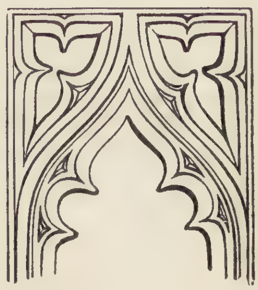
"The parts of tracery are ornamented with small arches and points, which are called *featherings* or *foliations,* and the small arches, *cusps;* and, according to the number in immediate connexion, they are called *trefoils, quatrefoils,* and *cinquefoils.*

Trefoil.

Quatrefoil.



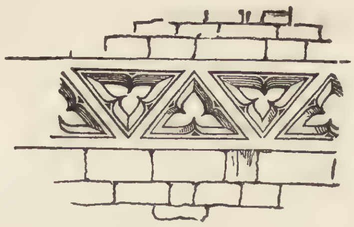
Cinquefoils.



"The cusps are sometimes again feathered, and this is called *double feathering.*

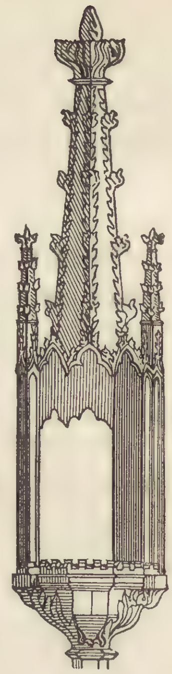
"*Tablets* are small projecting mouldings or strings, mostly horizontal. The tablet at the top, under the battlement, is called a *cornice,* and that at the bottom a *basement,* under which is generally a thicker wall. The tablet running round doors and windows is called a *drip-stone,* and if ornamented, a *canopy.*

" *Bands* are either small strings round shafts, or a horizontal line of square, round, or other panels, used to ornament towers, spires, and other works.



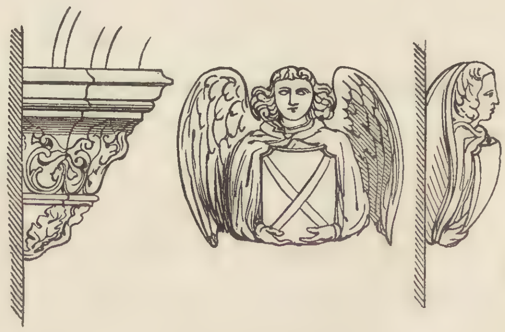
Band.

" *Niches* are small arches, mostly sunk in the wall, often ornamented very richly with buttresses and canopies, and frequently containing statues.



Niche.

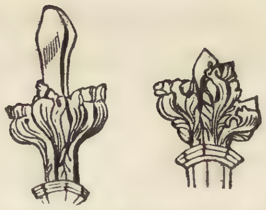
" A *corbel* is an ornamented projection from the wall to support an arch, niche, beam, or other apparent weight, and is often a head, or part of a figure.



" A *pinnacle* is a small spire, generally with four sides, and ornamented; it is usually placed on the top of buttresses, both external and internal.

" The small bunches of foliage, ornamenting canopies and pinnacles, are called *crokets.*

"The larger bunches on the top are called *finials;* and this term is sometimes applied to the whole pinnacle.



"The seats for the dean, canons, and other dignitaries, in the choirs of collegiate churches, are called *stalls.*

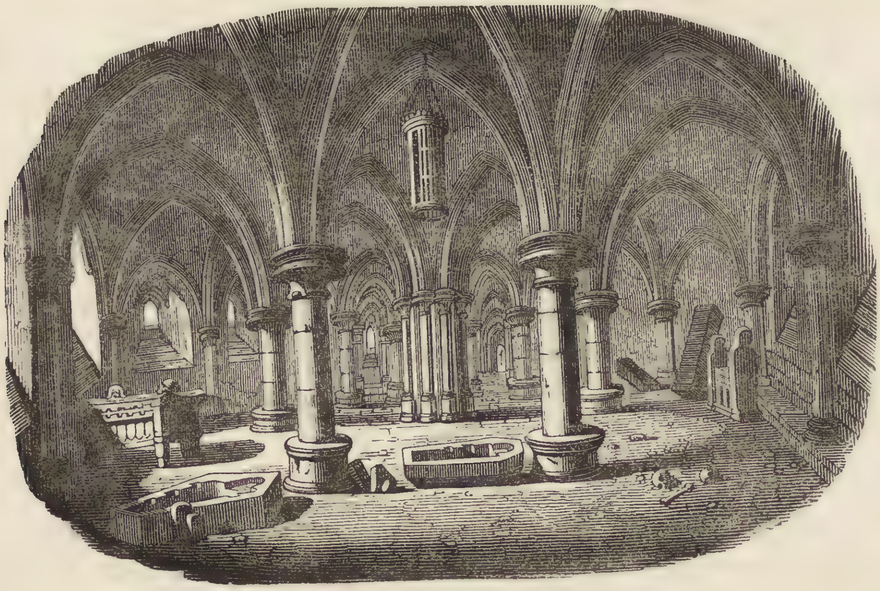
"The bishop's seat is called his *throne.*

"The ornamented open work over the stalls, and, in general, any minute ornamental open work, is called *tabernacle-work.*

"In some churches, not collegiate, there yet remains a screen, with a large projection at the top, between the nave and the chancel, on which were anciently placed certain images: this was called the *rood-loft.*

"Near the entrance-door is sometimes a small niche, with a basin, which held, in catholic times, their holy water: these are called *stoups.* Near the altar, or at least where an altar has once been placed, there is sometimes found another niche, distinguished from the stoup by having a small hole at the bottom to carry off water; it is often double, with a place for the bread.

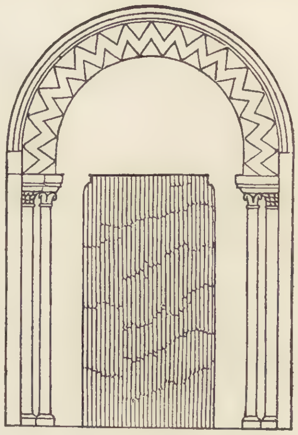
"Under several large churches, and some few small ones, are certain vaulted chapels: these are called *crypts.*"



Crypt under part of the Cathedral at Wells.

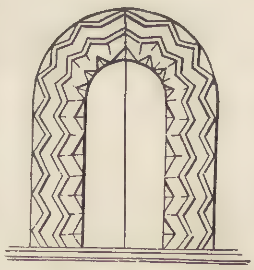
We shall here add, abridged from the same work, the details of the four periods, or styles, described by Mr. Rickman.

Norman Doors.

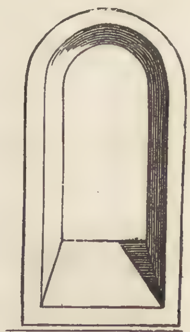


The arch is semi-circular, the richness of which was increased by increasing the number of mouldings, and consequently the depth of the arch. The arches are sometimes supported on columns, but as frequently they are formed without. Between the capital of the column and the springing of the arch, there is most frequently an impost moulding. The arch mouldings are generally much ornamented, and the wave or zigzag ornament is almost universal, as well as a large round moulding, with heads on the outer edge, partly projecting over this moulding. The external moulding is often slôped at the springing of the arch, forming an apparent drip-stone, though not always projecting so as to form one. The door is frequently square, and the space between the head of the door and the arch is often filled with carvings. While the exterior of doors is richly decorated, the interior is most frequently quite plain. Norman doors are frequently to be met with in England, all, however, so varied in design, that it is difficult to find two alike.

Norman Windows.



External Elevation.



Internal Elevation.

The windows are similar to the doors, small in size, except in large works. A double window is frequently divided by a column. In small rich churches, the exterior is often a series of arches, of which a few are pierced as windows, and the others left blank. The arch is semi-circular, and, if the window is quite plain, has generally sloped sides, either inside or out, or both. The proportions of Norman windows are generally those of Norman doors, and very rarely exceed two two squares in height of the exterior proportions, including the ornaments.

Norman Arches.

The early Norman arches are semi-circular, and, in many instances, this form of arch seems to have continued to the latest date, even where some of the parts were quite advanced into the next style; of this, in the Temple church, which is a curious instance, there are piers with some of the features of the next style, and also pointed arches, with a range of intersecting heads, and over this the old round-headed Norman window. But though the round arch

continued to the very end of the style, the introduction of pointed arches must have been much earlier, for we find intersecting arches in buildings of the purest Norman, and whoever constructed them, constructed pointed arches; but it appears as if the round and pointed arches were, for nearly a century, used indiscriminately, as was most consonant to the necessities of the work, or the builder's ideas. Some Norman arches are so near a semi-circle as to be only just perceptibly pointed; some few are of a very curious shape, being more than a semi-circle, or what is called a horse-shoe, and there are a few instances of a double arch; both these kinds of arches are often enriched with the ornaments peculiar to this style.

Norman Piers.

There are four kinds of Norman piers. The first, a round massive columnar pier, with a capital sometimes round and sometimes square. The column is often decorated with channels and bands, in various forms; sometimes spiral, sometimes zigzag, and at others like net-work. These columns are from two to seven diameters high. The second is a multangular pier, much less massive, generally octagonal, and commonly with an arch, more or less pointed. The third is a common pier with shafts. The capitals are sometimes plain and sometimes carved with rude foliage or animals, and the shafts are mostly set in square recesses. The fourth is a plain-faced pier, with perfectly plain round arches, in two or three divisions, and is shown in *Fig. 2.*

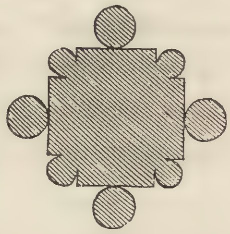


Fig. 1.

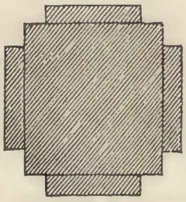


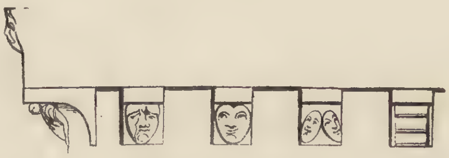
Fig. 2.

Norman Buttresses,

Are plain broad faces, projecting a few inches, running up to the cornice-tablet, and finishing under its projection. Sometimes they are finished with a plain slope, and, in a few instances, are composed of several shafts. Bands or tablets running along the walls often run round the buttresses. There are, however, in rich buildings, buttresses ornamented with shafts at the angles, and, in addition to these shafts, small series of arches are sometimes used; occasionally a second buttress, of less breadth, is placed on the outside of the broad flat one.

Norman Tablets.

In treating of tablets, that which is usually called the cornice is of the first consideration; this is frequently only a plain face of parapet, of the same projection as the buttresses; but a row of blocks is often placed under it, some of which are occasionally carved, representing grotesque heads; in some instances the grotesque heads support small arches, and it is



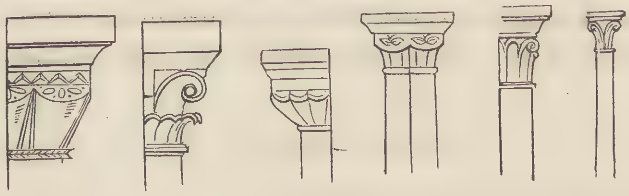
then called a corbel table. A plain string is also sometimes used as a cornice. The next most important tablet is the drip-stone, or outer moulding of windows and doors; this is a square string, frequently continued horizontally, from one window to another, round the buttresses. The tablets under windows are generally plain slopes above or below a flat string. In the interior, and in some instances in the exterior, these are much ornamented.

Norman Niches,

Are a series of small arches, with round and often with intersecting arches, sometimes without, but more frequently with columns. The arch mouldings are sometimes decorated. Niches of various shapes are placed over doors, in which are figures; these are generally of small depth.

Norman Ornaments.

These are carved on the mouldings of doors, windows, tablets, and on the columns. The first is the zigzag, or chevron moulding, most frequently used. The beak-head moulding, used in doors, is very common, it consists of a hollow and a large round; in the hollow are placed heads of beasts or birds, whose tongues or beaks encircle the round. Another variety is given in the wood-cut below. The capitals of piers and shafts are often very rudely carved in various grotesque devices of animals and leaves, but in all the design is rude, and the plants are unnatural. The moulding of the square abacus, over the flowered part of the capital, consists of a broad fillet and hollow, separated by a little sunk channel; this is sometimes continued as a tablet along the walls.



Norman Steeples.

The Norman steeple was mostly a massive tower, seldom rising more than a square in height above the roof of the building to which it belonged, and often not so much. They are sometimes plain, but often ornamented by intersecting arches, and have generally the flat buttress.

Norman Battlements.

It is difficult to ascertain what the Norman battlement was, but there seems much reason to suppose it was only a plain parapet, with here and there a narrow interval cut in it.

Norman Roofs.

The Norman wooden roof was often open to the actual frame-timbers. A flat boarded ceiling at Peterborough is in fine preservation, having lately been carefully re-painted from the original. It consists of a sort of rude Mosaic, full of stiff lines, and its general division is into lozenges, with flowers of Norman character, and the whole according in design with the ornaments of that style. In small churches and in crypts are many fine examples of the Norman groined roof. They consist of cross springers, and sometimes, but not always, of a rib from pier to pier; they are sometimes plain, but oftener ornamented with ribs of a few bold mouldings, the mouldings being sometimes enriched.

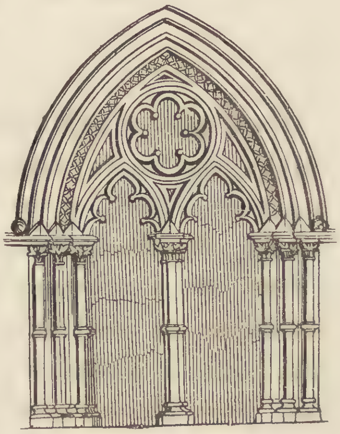
Norman Fronts,

Consist of a large door, with a triforium or gallery over it, of which some of the arches have been pierced through for windows, and above one larger window. The east front much resembled the west, except the door. There are a few large buildings, and many small ones, with semi-circular ends. Norman fronts are very numerous, perhaps as much so as Norman doors, and some are very curious, from the intricacy and rudeness of the decorations.

Porches.

These are generally shallow, and the mouldings of the outer gate are often richer than those of the inner.

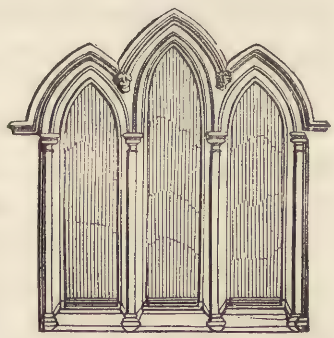
Early English Doors,



Are all pointed, at least all the exterior ornamented ones; for there are small interior doors of this style with flat tops, and the sides of the top supported by a quarter circle from each side The large doors of this style are often double, the two being divided by either one shaft or several clustered, and a quatrefoil or other ornament over them; the recess of these doors is often as deep as the Norman, but the bands and shafts are more numerous, being smaller, and in the hollow mouldings they are frequently enriched with the peculiar ornaments of this style,—a singular toothed projection, which, when well executed, has a fine effect; and sometimes a still higher enriched moulding,

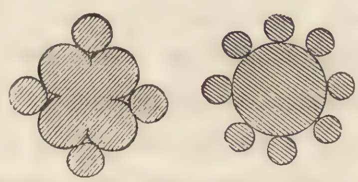
or band of open-work flowers. The dripstone is generally clearly marked, and often small, and supported by a head. In many doors, a trefoil and even cinquefoil feathering is used, the points of which generally finish with balls, roses, or some projecting ornament. The principal moulding of these doors has generally an equilateral arch, but, from the depth and number of the mouldings, the exterior becomes often nearly a semi-circle. In interiors, and perhaps sometimes too in the exterior, there are instances of doors with a trefoil-headed arch. The shafts attached to these doors are generally round, but sometimes filleted, and they generally, but not always, stand free. They have a variety of capitals, many plain, but many with delicate leaves running up and curling round under the cap moulding, often looking like Ionic volutes; the bases are various, but a plain round and fillet is often used, and the reversed ogee introduced. The most prevalent base, and what is used not only to shafts, but sometimes as a base tablet, is curious, from its likeness to the Grecian attic base; like that, it consists of two rounds, with a hollow between, and that hollow is often deepened, so that if water gets into it the water remains, and it is the almost only instance of a moulding used in Gothic work which will hold water, they are in general so constructed as entirely to free themselves from rain, and in a great measure from snow. All these mouldings are cut with great boldness; the hollows form fine deep shadows, and the rich bands of open-work leaves are as beautiful as those executed at any subsequent period, being sometimes entirely hollow, and having no support but the attachment at the sides and the connexion of the leaves themselves.

Early English Windows.



These are long, narrow, and lancet-headed, generally without feathering, but in some instances trefoiled. Where there are two, there is often a trefoil or quatrefoil between the heads; and in large buildings, where there are three or more, the division is often so small that they seem to be the lights of a large window, but they are really separate windows, having their heads formed from different centres, and in general separate dripstones.

Early English Piers.



Of the piers of large buildings of this style, there are two distinguishing marks: first, the almost constant division, by one or more bands, of the shafts which compose them; and, secondly, the arrangement of these shafts for the most part in a circle. In general they are few, sometimes only four, sometimes eight, set round a large circular one; there are sometimes so many as nearly to hide the centre shaft: it consists of shafts, some of which are plain rounds, others filleted rounds, and some, whose plan is a spherical triangle, with the edge outwards. The capitals of these shafts

are various: in many, perhaps the greater number of buildings, they are plain, consisting of a bell with a moulding under it, and a sort of capping with more mouldings above, and these mouldings are often continued round the centre pier, so as to form a general capital. The dividing bands are formed of annulets and fillets, and are often continued under windows, &c. as tablets, and are, like the capitals, sometimes continued round the centre shaft. Another and a richer capital is sometimes used, which has leaves like those in the capitals of the door-shafts: this kind of capital is generally used where the shafts entirely encompass the centre one, the leaves being extremely well executed. The bases used are frequently near approaches to the Grecian attic base, but the reversed ogee is sometimes employed. There is another pier, in buildings that appears to be of this style, which, at times, is very confusing, as the same kind of pier seems to be used in small churches even to a very late date; this is the plain multangular pier, with a plain capital of a few very simple mouldings, with a plain sloped arch.

Early English Buttresses.

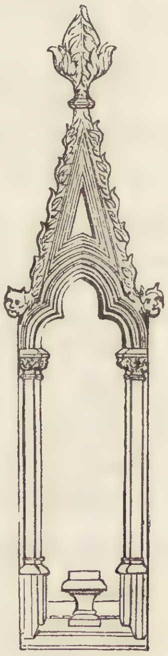
These are of four descriptions: 1st. A flat buttress, is often used, not always as broad as the Norman; its tablets are more delicate, and it has often the small shaft at the angle like the Norman. 2d. Is a buttress not so broad as the flat one, but nearly of the same projection as breadth, and carried up sometimes with only one set-off, and sometimes without any, and these have often their edges chamfered from the window tablet. They sometimes have a shaft at the corner, and in large rich buildings are occasionally panelled. These buttresses have also at times much more projection than breadth, and are sometimes filled with niches and other ornaments. 3d. A long slender buttress, of narrow face and great projection, in few stages, is used in some towers, but not very common. 4th. Towards the latter part of this style, the buttress in stages was used, but it is not very common, and is sufficiently distinguished by its triangular head, the usual finish of this style, which can hardly be called a pinnacle, though sometimes it slopes off from the front to a point. About this time the flying buttress began to be used.*

Early English Tablets.

The cornice is sometimes rich in mouldings, and often with an upper slope, making the face of the parapet perpendicular to the wall below. There are cornices of this style still resembling the Norman projecting parapet, but they consist of several mouldings. The hollow moulding of the cornice is generally plain, seldom containing flowers or carvings, except an ornament

* Rickman, page 63. Mr. Möller, however, thinks differently, see page 19, where he speaks of the Baths of Diocletian and the Palace at Spalatro.

resembling teeth, but under the mouldings there are often a series of small arches resembling the corbel table. The dripstone of this style is various, sometimes of several mouldings, sometimes only a round with a small hollow. It is, in the interior, occasionally ornamented with the toothed ornament, and with flowers. In some buildings, the dripstone is returned, and runs as a tablet along the walls: it is, in general, narrow, and supported by a corbel, either of a head or a flower. There are frequently, in large buildings, in the ornamented parts, bands of trefoils, quatrefoils, &c. some of them very rich. Although a sort of straight canopy is used over some of the niches of this style, yet it does not appear to have been used over windows or doors: in some buildings, where they are found, they appear to be additions. The tablets, forming the base mouldings, are sometimes a mere slope; at others, in large buildings, are of several sets of mouldings, each face projecting further than the other above it; but the reversed ogee is very seldom used, at least, not large and singly.



Early English Niches.

Of these, there are many of all stages of early English, there are sometimes two, but oftener three, and they are generally sunk in the wall, and adapted for a seat: the easternmost one is often higher in the seat than the others. They have sometimes a plain trefoil head, and sometimes ornamented with shafts; they are generally straight sided. The statuary niches, and ornamented interior niches, mostly consist of a series of arches, some of them slope-sided, and some with a small but not very visible pedestal for the statue. They are often grouped two under one arch, with an ornamental opening between the small arches and the large one, like the double doors: a straight-sided canopy is sometimes used, and a plain finial. These niches, except the chancel-stalls and the stoup and water-drain, are seldom single, except in buttresses, but mostly in ranges.

Early English Ornaments.

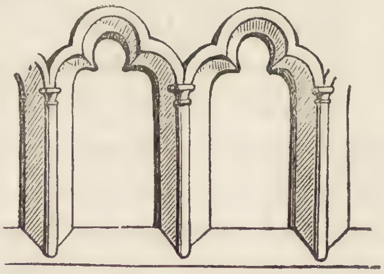
The first ornament to be described, is that already noticed as the peculiar distinction of this style, to which it seems nearly, if not exclusively, confined: it is the regular progression from the Norman zigzag to the delicate four-leaved flowers so common in decorated English buildings. Like the zigzag, it is generally straight-sided, and not round like the leaves of a flower, though, at a distance in front, it looks much like a small flower. It is very difficult to describe it, and still more so to draw it accurately; it perhaps may be understood as considering it a

succession of low square-pierced pyramids, set on the edges of a hollow moulding. Anothei ornament, though not peculiar in small works to this style, was seldom, but during its continuance, practised to so large an extent: this is the filling of the spaces above the choir arches with squares, enclosing four-leaved flowers. In many parts, as in the spandrels of door-arches and other plain spaces, circles, filled with trefoils and quatrefoils, with flowered points, are often introduced; these are of small depth, and are used in many buildings very freely: sometimes, instead of sunk panels, a sort of boss of leaves and flowers is used. In the early period of the style, crokets were not used, and the finial was a plain bunch of three or more leaves, or sometimes only a sort of knob; but in small rich works, towards the end of the style, beautiful finials and crokets were introduced.

Early English Steeples.

The Norman towers were short and heavy; the early English rose to a much greater height, and on the towers they placed that beautiful addition, the spire. Some of our finest spires are of this age, and the proportions observed between the tower and the spire are generally very good. When there is no parapet, the slope of the spire runs down to the edge of the wall of the tower, and finishes there with a tablet, and there is a double slope to connect the corners with the intermediate faces. The spire is often ornamented with ribs at the angles, sometimes with crokets on the ribs, and bands of squares filled with quatrefoils, &c. surrounding the spire at different heights.

Early English Battlements.



During nearly the whole of this style, the parapet, in many places plain, in others ornamented, continued to be used. Sometimes a series of panels, with trefoiled heads on shafts were used.

Early English Roofs.

Another description of groining, also peculiar to early English works, is one with an additional rib between the cross springer and the wall, and between the cross springer and the pier rib; this has a longitudinal and cross rib at the point of the arches, but it does not run to the wall, being stopped by the intermediate rib. Another variety is where there is no pier rib, but the two intermediate ribs are brought nearer together, and the longitudinal rib runs between them. The rib mouldings of these groins are not very large, and consist of rounds and hollows, and often have the toothed ornament in them and a sort of leaf. The bosses in these roofs are not many or very large, the intersections being frequently plain, but some of the bosses are very well worked. There do not appear to be any early English wooden roofs which can clearly be distinguished to be such.

Early English Fronts.

In general, the west fronts and transept ends have a door with one, two, three, or even four ranges of niches, windows, and arches over them. The west front of Lincoln Cathedral deserves minute examination for its details: the old Norman front is encompassed by early English, the workmanship of which is very superior; and a large feathered circle over the great door is nearly unique, from the exquisite workmanship of its mouldings, which consists of open-work band of flowers. It consists of three large arches, forming a sort of screen to the front; these arches have piers of many shafts and fine architraves, and the gables enriched with much small work of circles and arches, and a profusion of the toothed ornament over the whole.

Early English Porches.

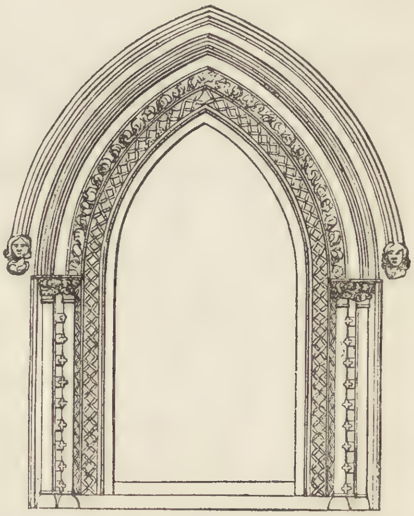
Of these, which in general are larger than the Norman porches, it will be sufficient to mention those of Salisbury and Lincoln Cathedrals. The first is attached to the north side of the nave, of which it occupies one division, rising as high as the aisles: it consists of a noble, plain, arched entrance, over which are two double windows, close together, resting on a tablet, and quite in the peak of the gable two small niches, close together, resting on another string. The interior is groined in two divisions, and its walls ornamented with sunk panelling. The lower part of the porch, at Lincoln, is a rich piece of groined-work, with three entrances, north, south, and west, over which is a small room; the whole of the porch is well worked and richly ornamented.

In this style, we have one building, Salisbury Cathedral, remaining, worked in the best manner, of great size, and in excellent preservation, and it gives a very high idea of the great improvement of this style on the Norman. Magnificent without rudeness, and rich though simple, it is one uniform whole. In the interior arrangements of large buildings, we find the triforium a very prominent feature; it is large in proportion to the work above it and below it, and is generally the most ornamented part of the work. In small churches, the triforium is generally omitted. Among the greatest beauties of this style are some of the chapter-houses: those of Lincoln and Lichfield are both ten-sided figures, but of very different arrangement; those also of Chester and Oxford, both parallelograms, deserve particular attention; but that of Salisbury, a regular octagon, and of a character quite late in the style, is one of the most beautiful buildings remaining, its composition is peculiarly elegant, and its execution, Mr. Rickman thinks, is not excelled by any.

Little has been done in either restoring or imitating this style, neither is it easy to do either well, but it deserves attention, as in many places it would be peculiarly appropriate, and perhaps would be better employed in building small country churches, on account of its cheapness, when compared with the other styles.

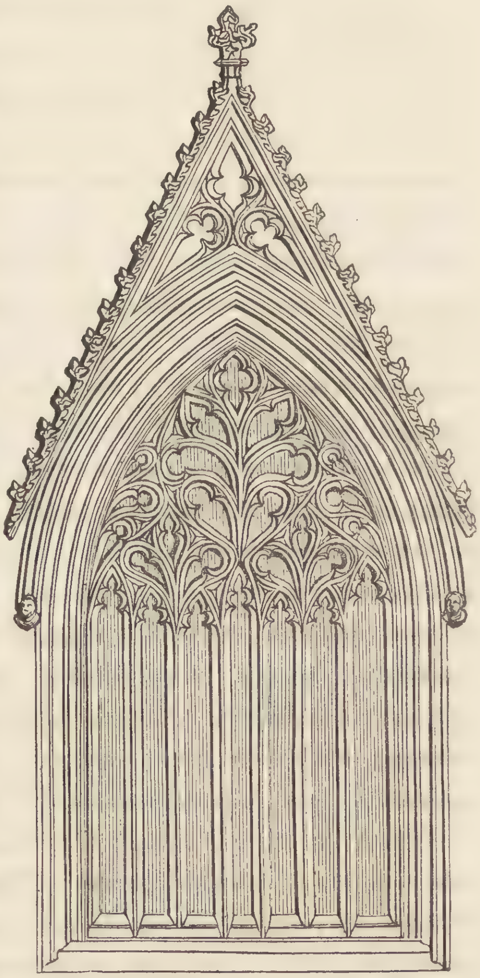
Decorated English Doors.

The large doors of the last style are mostly double, and there are some fine ones of this, but they are not so common, there being more single doors, which are often nearly as large as the early English double ones, and, indeed, but for the ornaments, they are much alike, having shafts and fine hollow mouldings. The small doors are frequently without shafts, but the arch-mouldings run down the sides and almost to the ground without a base, the mouldings being set upon a slope; and, frequently, when the base tablets consist of two sets of mouldings, with a face between, it is only the lower one that runs into the architrave to stop the mouldings. The shafts do not, in this style, generally stand free, but are parts of the sweep of mouldings; and instead of being cut and set up lengthways, all the mouldings and shafts are cut on the arch-stone, thus combining great strength with all the appearance of lightness. The capitals of these shafts differ from the early English, in being formed of a woven foliage, and not upright leaves; this, in small shafts, generally has an apparent neck, but in larger ones, often appears like a round ball of open foliage. There are also, in many good buildings, plain capitals without foliage; these have an increased number of mouldings from those of the last style, and they generally consist of three sets, one of which may be considered the abacus, then a hollow and another set, then the bell of the capital, then the mouldings forming the astragal; and, both in plain and flowered capitals, where the shaft is filleted, it is common for the fillet to run through the astragal and appear to die into the bell. The bases to these shafts mostly consist of the reversed ogee, but other mouldings are often added, and the ogee made in faces. Although the doors, in general, are not so deeply recessed as the Norman and early English, yet, in many large buildings, they are very deep. To the open-work bands of the last style, succeeds an ornament equally beautiful, but not so fragile,—this is the flowered moulding,—there are often three or four in one door-way; and, to the toothed ornament, succeeds a flower with four leaves, in a deep moulding, with considerable intervals between: this flower, in some buildings, is used in great profusion to good effect. Over these doors, there are several sorts of canopies. The dripstone is generally supported by a corbel, which is commonly a head; in some instances, a plain return is used, but that return seldom runs horizontally. The canopy is sometimes connected with the dripstone, and sometimes distinct. The common canopy is a triangle; the space between it and the dripstone is filled with tracery, and the exterior ornamented with crokets, and crowned with a finial. The second canopy is the ogee, which runs about half the dripstone, and then is turned the contrary way, and then



is finished in a straight line, running up into a finial: this has its intermediate space filled with tracery, &c. and is generally croketed. Another sort of canopy, is an arch running over the door, and unconnected with it, which is doubly foliated; it has a good effect, but is not common. On one side of the doors, small buttresses or niches are sometimes placed. In small churches, there are often neat plain doors, having only a dripstone and a round moulding on the interior edge, and the rest of the wall a bold hollow, and, in some instances, a sloping side only. In some doors of this style, a series of niches, with statues, are carried up, like an hollow moulding; and, in others, doubly foliated tracery, hanging free from one of the outer mouldings, gives a richness superior to any other decoration.

Decorated English Windows.



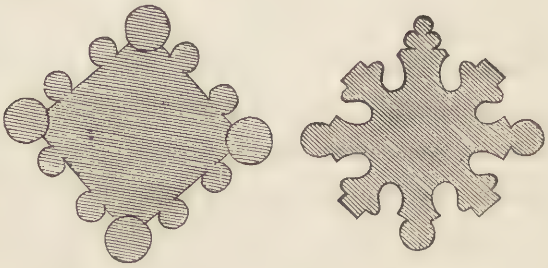
In these, the clearest marks of the style are to be found, and they are various, yet all on one principle. An arch is divided by one or more mullions into two or more lights, and these mullions branch into tracery of various figures, but do not run in perpendicular lines through the head. In small churches, windows of two or three lights are very common, but in larger, four or five lights; for the aisles and clerestory windows, five or six; for transepts and the end of aisles, and in east and west windows, seven, eight, and even nine lights are used; nine lights seem to be the extent, but there may be windows of this style containing more. There may be observed two descriptions of tracery, and, although in different parts, they may have been worked at the same time, yet the first is generally the oldest. In this first division, the figures, such as circles, trefoils, quatrefoils, &c. are all worked with the same moulding, and do not always regularly join each other, but touch only at the points. The second division consists of what may be called flowing tracery: in the richer windows of this style, and in both divisions, the principal moulding of the mullion has sometimes a capital and base, and thus becomes a shaft. One great cause of the beauty of fine flowing tracery, is the intricacy and delicacy of its mouldings; the principal moulding upon only one or two mullions, and forming only a part of the larger design, and all the small figures being formed in mouldings, which spring from the sides of the principal. The architraves of windows of this

style are much ornamented with mouldings, which are sometimes made into shafts. The dripstone, and canopies of windows are the same as in the doors, and have been described under that head. Wherever windows of this style remain, an artist should copy them; the varieties are much greater than might be supposed, for it is very difficult to find two alike in different buildings. It does not appear that the straight horizontal transom was much, if at all, used in windows of this style; wherever it is found, there is, generally, some mark of the window originating after the introduction of the Perpendicular style, but it may have been used in some places; and there are very few instances of a light being divided in height by a kind of canopy, or a quatrefoil, breaking the mullion. In some countries, where flint and chalk are used, the dripstone is sometimes omitted. The heads of the windows of this style are most commonly the equilateral arch, though there are many examples both of lancet and drop arches, but the lancet arches are not very sharp. There are a few windows of this style, with square heads, but they are not very common. The circular windows of this style, are, some of them, very fine. Towards the end of this style, and, perhaps, after the commencement of the next, we find windows of most beautiful composition, with parts like the perpendicular windows; and sometimes a building has one end decorated, the other perpendicular.

Decorated English Arches.

Though the arch most commonly used for general purposes, in this style, is the equilateral one, yet this is by no means constant. The architrave mouldings of interior arches do not differ much from those of the last style, except that they are, perhaps, more frequently continued down the pier without being stopped at the line of capitals, and that the mouldings composing them are of a larger size and bolder character, though in large buildings still consisting of many mouldings. The dripstones are of delicate mouldings, generally supported by heads. The arches of the galleries are often beautifully ornamented with foliated heads and fine canopies; and in these arches, the ogee arch is sometimes used, as it is freely in composition in the heads of windows.

Decorated English Piers.



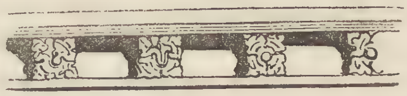
A new disposition of shafts marks very decidedly this style in large buildings, they being arranged diamond-wise, with straight sides, often containing as many shafts as will stand close to each other at the capital, and only a fillet or small hollow between them. The shaft which runs up to support the roof, often springs from a rich corbel between the outer architrave mouldings of the arches. The capitals and bases of these shafts are much the same

as those described in the section on doors. Another pier, of the richest effect, but seldom executed, is that where the centre shaft is larger than those of each side of it, and the three all run through to the spring of the roof: three also support the side of the arch. These shafts are larger in proportion to those of Exeter, &c., and stand nearly close, without any moulding between. Another pier, common towards the end of this style, and the beginning of the next, is composed of four shafts, about two-fifths engaged, and a fillet and bold hollow, half as large as the shafts, between each; this makes a very light and beautiful pier, and is much used in small churches. All these kind of piers have their shafts sometimes filleted, and the architrave mouldings are often large ogees. In small country churches, the multangular flat-faced pier seems to have been used.

Decorated English Buttresses.

These, though very various, are all more or less worked in stages, and the set-offs variously ornamented, some plain, some moulded slopes, some with triangular heads, and some with panels; some with niches in them, and with all the various degrees of ornament The corner buttresses of this style are often set diagonally. In some few instances, small turrets are used as buttresses. The buttresses are variously finished; some slope under the cornice, some just through it, some run up through the battlements, and are finished with pinnacles of various kinds. Of rich buttresses, three examples deserve great attention: the first is in the west front of York Minster, and may be considered in itself as a magazine of the style; its lower part, to which it ascends without set-off, consists of four series of niches and panelling of most delicate execution; above this part it rises as a buttress to the tower, in four stages of panels, with triangular croketed set-offs. The first of these stages contains a series of statuary niches, the rest are only panelled. This buttress finishes under the cornice with an ornamented panel and croketed head; the projection of the lower part of this buttress is very great, and gives to the whole great boldness as well as richness. The second is a ruin, the east end of Howden Church, Yorkshire; it has also some niches, but not so many as that at York. The third is also a ruin, the east end of the Priory of Walsingham, Norfolk; this is very late, and may perhaps be considered as almost a perpendicular work, but it has so much of the rich magnificence of the decorated style, that, from its great plain spaces, it deserves noticing as such; it is, in fact, a flat buttress set up against one face of an octagonal turret, and terminates in a fine triangular head richly croketed.

Decorated English Tablets.



The cornice is very regular, and though, in some large buildings, it has several mouldings, it principally consists of a slope above, and a deep sunk hollow, with an astragal under it; and in these hollows, flowers, at regular distances, are often placed, and in some large buildings, and in towers, &c., there are frequently heads, and the cornice almost filled with them. The dripstone is of the same description of mouldings, but smaller, and this, too, is sometimes enriched with flowers. The small tablets running under the windows have nearly the same mouldings, and this sometimes runs round the buttress also. The dripstone very seldom, if ever, runs horizontally, though, in a few instances, a return is used instead of the more common corbel head. The general base tablet of this style is an ogee, under which is a plain face, then a slope, and then another plain face, and it is not common to find real decorated buildings with more tablets, although both in the early English and perpendicular styles, three, four, and even five, are used. And here another singularity, with respect to tablets, may be mentioned: it is common in early English work for the dripstone to be carried horizontally after the return, at the spring of the arch, till stopped by a buttress, &c., and sometimes it is even carried round the buttress; and the same arrangement is common in perpendicular work, but very rarely, if ever, is it so used in the decorated style.

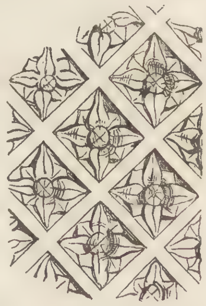
Decorated English Niches.

These form one of the greatest beauties of the style, and are very various, but may be divided into two grand divisions, which, if necessary, might be again divided, such is their diversity; but these two may be sufficient. The first are panelled niches, the fronts of whose canopies are even with the face of the wall or buttress they are set in. These have their interiors either square, with a sloping side, or are regular semi-hexagons, &c. In the first case, if not very deep, the roof is a plain arch, but in the latter case, the roof is often most delicately groined, and sometimes a little shaft is set in the angles or the ribs of the roof, supported by small corbels. The pedestals are often high and much ornamented. The other division of niches have projecting canopies: these are of various shapes, some conical, like a spire, some like several triangular canopies joined at the edges, and some with ogee heads, and, in some very rich buildings, are niches with the canopy bending forwards in a slight ogee, as well as its contour being an ogee; these are generally crowned with very large rich finials,

and very highly enriched. There were also, at the latter part of this style, some instances of the niches with a flat-headed canopy, which became so common in the next style. These projecting niches have all some projecting base, either a large corbel, or a basement pedestal, carried up from the next projecting face below. All these niches are occasionally flanked by small buttresses and pinnacles; those of the first kind have very often beautiful shafts.

Decorated English Ornaments.

As the word decorated is used to designate this style, and particularly as the next has been called florid, as if it were richer in ornament than this, it will be necessary to state, that, though ornament is often profusely used in this style, yet these ornaments are like Grecian enrichments, and may be left out without destroying the grand design of the building; while the ornaments of the next are more often a minute division of parts of the buildings, as panels, buttresses, &c. than the carved ornaments used in this style. In some of the more magnificent works, a variety of flowered carvings are used all over, and yet the building does not appear overloaded; while some of the late perpendicular buildings have much less flowered carvings, yet look overloaded with ornaments, from the fatiguing recurrence of minute parts, which prevent the comprehension of the general design. The flower of four leaves, in a hollow moulding, has already been spoken of, and in these hollow mouldings, various other flowers are introduced, as well as heads and figures, some of them very grotesque, and the capitals are very seldom two alike; the foliage forming the crokets and finials is also extremely rich, and the pinnacle, in its various forms, is almost constantly used. The spandrels of ornamental arches are sometimes filled with beautiful foliage. An ornament almost peculiar to the decorated style,

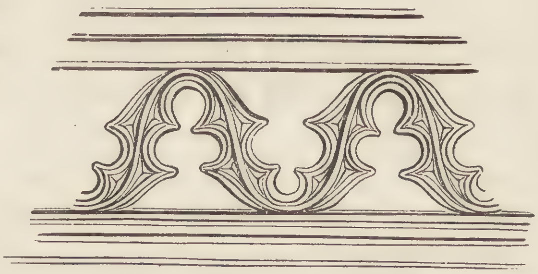


as the toothed ornament to the early English, is the small round bud of three or four leaves, which open just enough to show a ball in the centre; this is generally placed in a hollow moulding, and has a beautiful effect. On the steeple of Salisbury, knobs are used very profusely, in many parts, as crokets; these are plain, but are so, most likely, on account of the distance from the eye; and these, and some other details, show the decorated date of this steeple, though its composition is assimilated to the early English building it is raised upon. It is seldom safe to judge of date solely by the character of the ornamental carvings, yet, in many instances, these will be very clear distinctions.

Decorated English Steeples.

At the commencement of this style, several fine spires were added to towers then existing, and, in after times, many very fine towers and spires were erected. These are generally flanked with buttresses, many of which are diagonal, and are generally crowned with fine pinnacles.

Decorated English Battlements.



A parapet continues frequently to be used in the decorated style, but it is often pierced in various shapes, of which quatrefoils in circles, or without that inclosure, are very common; but another, not so common, is more beautiful, this is a waved line, the spaces of which are trefoiled. The plain battlement, most in use, in this style, is one with small intervals, and the capping moulding only horizontal; but there may be some battlement, perhaps, of this date, with the capping running both vertically and horizontally. In some small works of this style, a flower is occasionally used as a finish above the cornice, but it is by no means common.

Decorated English Roofs.

The decorated groined roof is an increase on the last style in the number of ribs; those of the simplest kind consisted of the longitudinal and crossing rib at the point of the arches, with the cross springers and pier-rib, with also an intermediate rib between the cross springers and the pier-rib; and the wall arch and these intermediate ribs increased in number, and adorned with small ribs, forming stars and other figures by their intersections, give a varietv to the groining almost equal to the tracery of windows. In this style the rib mouldings are generally an ogee for the exterior; and hollows and rounds, with different fillets, towards the ceiling: in some few instances, a principal and secondary rib are employed. The bosses are placed at all the intersections, and are often most beautifully carved. There are buildings in which, though the upper roof is shown, there is a preparation for an inner roof; such is Chester cathedral, where only the lady chapel and the aisles of the choir are groined, and the whole of the rest of the church is open, but on the top of the shafts is the commencement springing of a stone roof. There remain a few roofs, which appear to be of a decorated character, that are open to the roof framing, and have a sort of panelled work in ogee quatrefoils, in timber, between the principals, which have arched ornamental work. These are getting very scarce, as they are hardly ever repaired but by new work of a totally different kind.

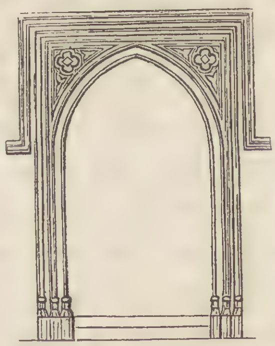
Decorated English Fronts.

The east fronts of decorated buildings consist so often of one large window for the chancel or choir, and two smaller ones for the aisles, if there be any, that little need be said of their composition, as all its variation, in general, depends on the variety of buttresses, &c. used as finishings.

Decorated English Porches.

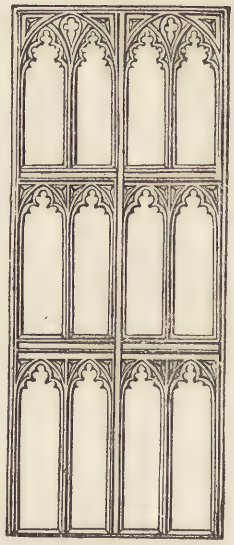
There are not many of these remaining, but under this head, may be noticed three beautiful gates, one at Bury St. Edmund's, another at Thornton, in Lincolnshire, and a third at the Augustine Monastery, Canterbury, all which are, in some degree, assimilated to porches. These three are of varied composition, but all contain very valuable details. The general appearance of decorated buildings is at once simple and magnificent; simple from the small number of parts, and magnificent from the size of the windows, and the easy flow of the lines of tracery. In the interior of large buildings, we find great breadth, and an enlargement of the clerestory windows, with a corresponding diminution of the triforium, which is more a part of the clerestory opening than a distinct member of the division. The roofing, from the increased richness of the groining, becomes an object of attraction.

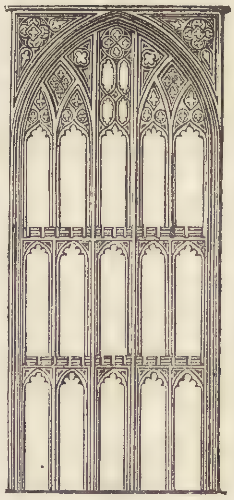
Perpendicular English Doors.



The great distinction in perpendicular doors, from those of the last style, is the almost constant square head over the arch, which is surrounded by the outer moulding of the architrave, and the spandrel filled with some ornament, and over all a dripstone is generally placed. In large very rich doors, a canopy is sometimes included in this square head, and sometimes niches are added at the sides. This square head is not always used in the interior, for an ogee canopy is sometimes used, or panels down to the arch; and there are some small exterior doors without the square head. The shafts used in these doors are small, and have mostly plain capitals, which are often octagonal, and the bases made so below the first astragal. But there are still, in the early part of the style, some flowered capitals; and in those to the shafts of the piers, in small churches, it is common for the capital to have in its hollows one or two square flowers; the mouldings of the capitals often contain, more particularly in the later dates of this style, a member, which is precisely the cyma-recta of Grecian work. In small works, the bases of shafts have many mouldings: repetitions of ogee are mostly used, intermixed with hollows or straight slopes; the architraves of these doors have generally one or more large hollows, sometimes filled with statuary niches, but more often plain; this large hollow, in the architraves of both doors and windows, is one of the best marks of this style.

Perpendicular English Windows.





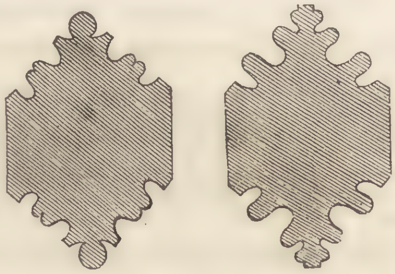
These are easily distinguished by their mullions running in perpendicular lines, and the transoms, which are now general. The varieties of the last style were in the disposition of the principal lines of the tracery; in this they are rather in the disposition of the minute parts: a window of four or more lights is generally divided into two or three parts, by strong mullions running quite up, and the portion of arch between them doubled from the centre of the side division. In large windows, the centre one is sometimes again made an arch; and often in windows of seven or nine lights, the arches spring across, making two of four or five lights, and the centre belonging to each. The heads of windows, instead of being filled with flowing ramifications, have slender mullions running from the heads of the lights between each principal mullion, and these have small transoms, till the window is divided into a series of small panels, and the heads being arched, are trefoiled or cinquefoiled. Sometimes these small mullions are crossed over each other in small arches, leaving minute quatrefoils, and these are carried across in straight lines. Under the transom is generally an arch. In the later windows of this style, the transoms are often ornamented with small battlements and flowers, which, when well executed, has a fine effect. There are some good windows, of which the heads of the mullions alternate, that is, the perpendicular line rises from the top of the arch of the panel below it. The east window of the Beauchamp Chapel, at Warwick, is extremely rich, and has, both within and without, many singularities. The mullions, which divide it into three parts, have part of the great hollow for their mouldings, which, on the inside, is filled with very rich statuary niches; the centre part of this window is divided into minute panellings in the upper part. It is necessary here to say a little of a window which may be mistaken for a decorated window: this is one of three lights, used in many country churches, the mullions simply cross each other, and are cinquefoiled in the heads, and are quatrefoiled in the three upper spaces; but to distinguish this from a decorated window, it will generally be necessary to examine its arch, its mullion mouldings, and its dripstone, as well as its being, as it often is, accompanied with a clearly perpendicular window at the end, or connected with it, so as to be evidently of that time. Its arch is generally four-centered, which at once decides its date; its mullion mouldings are often small, and very delicately worked; its dripstone, in many instances, has

some clear mark, and when the decorated tracery has become familiar, it will be distinguished from it by its being a mere foliation of a space, and not a flowing quatrefoil, with the mouldings carried round it. Large circular windows do not appear to have been in use in this style. When canopies are used, which is not so often as in the last style, they are generally of the ogee character, beautifully croketed.

Perpendicular English Arches.

Although the four-centered arch is much used, particularly in the latter part of this style, yet, as in all the other styles, we have in this, arches of almost all sorts, amongst the ornamental part of niches, &c., and, in the composition lines of panels, are arches from a very fine thin lancet to an almost flat segment; yet, with all this variety, the four-centered arch is the one most used in large buildings; and the arches of the other character, used in the divisions of the aisles, begin to have one of the greatest distinctions of this style, the almost constant use of mouldings running from the base all round the arch without any stop horizontally by way of capital, sometimes with one shaft and capital, and the rest of the lines running, the shafts in front running up without stop to the roof, and from their capitals springing the groins. In window arches, shafts are now seldom used, the architrave running all round, and both window arches and the arches of the interior are often enclosed in squares, with ornamented spandrels, either like the doors or of panelling. Interior arches seldom have any dripstone where the square is used. Another great distinction of these arches in large buildings, is the absence of the triforium, or gallery between the arches of the nave and the clerestory windows; their place is now supplied by panels or statuary niches, or they are entirely removed.

Perpendicular English Piers.

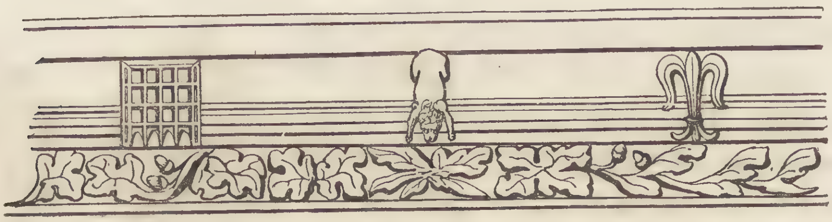


The massive Norman round pier, lessened in size and extended in length with shafts set round it, became the early English pier; these shafts were multiplied and set in the face of the pier, which became in its plan lozenge, and formed the decorated pier. We now find the pier again altering its shape, becoming much thinner between the arches, and its proportion the other way, from the nave to the aisle, increased, by having those shafts which run to the roofs to support the springing of the groins added in front, and not forming part of the mouldings of the arch, but having a bold hollow between them. Though filleted shafts are not so much used as in the last style, the exterior moulding of the architraves of interior arches is sometimes a filleted round, which has a good effect; and, in general, the mouldings, parts of piers, architraves, &c. are much smaller than those used in the last style, except the large hollow before mentioned.

Perpendicular English Buttresses.

These differ very little from those of the last style, except that triangular heads to the stages are less used, the set-offs being much more often bold projections of plain slopes, yet many fine buildings have the triangular heads. In the upper story the buttresses are often very thin, and have diagonal faces. There are a few large buildings of this style, without flying buttresses, and these are often pierced; they are generally filled with rich tracery, and the buttresses are octagonal turrets. There are a few buildings of this style without any buttresses. All the kinds are occasionally ornamented with statuary niches, and canopies of various descriptions; and the diagonal corner buttress is not so common as in the last style, but the two buttresses often leave a square which runs up, and sometimes is crowned with a third pinnacle. Although pinnacles are used very freely in this style, yet there are some buildings whose buttresses run up and finish square without any. In interior ornaments, the buttresses used are sometimes small octagons, sometimes panelled, sometimes plain, and then, as well as the small buttresses of niches, are often banded with a band different from the early English, and much broader. The small buttresses of this style attached to screen-work, stall-work, and niches, are different from any before used, and they form a good mark of the style. The square pedestal of the pinnacle being set with an angle to the front, is continued down, and on each side is set a small buttress of a smaller face than this pedestal, thus leaving a small staff between them; these buttresses have set-offs, and this small staff at each set-off has the moulding to it, which being generally two long hollows, and a fillet between, has on the staff the appearance of a spear-head.

Perpendicular English Tablets.

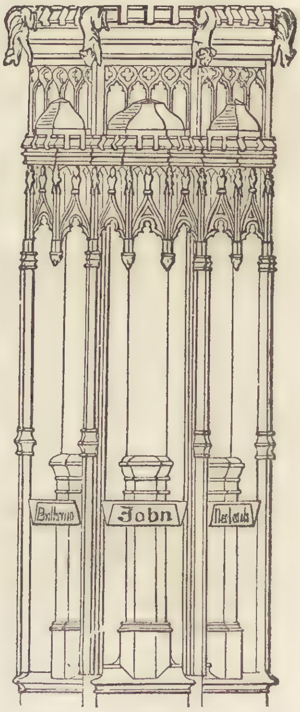


The cornice is now, in large buildings, often composed of several small mouldings, sometimes divided by one or two considerable hollows, not very deep, yet, in plain building, the old cornice mouldings are much adhered to, but it is more often ornamented in the hollow with flowers, &c., and sometimes with grotesque animals. In the latter end of this style, something very analagous to an ornamented frieze is perceived, of which the canopies to the niches, in various works, are examples; and the angels, so profusely introduced, are a sort of cornice ornament. The dripstone of this style is in the heads of doors, and some windows, much the

same as in the last style, and it most generally finishes with a plain return, though corbels are sometimes used; this return is frequently carried horizontally.

Tablets under the windows are like the dripstone, and sometimes fine bands are carried round as tablets. The basement mouldings are not materially different from the last style, reversed ogees and hollows, variously disposed, being the principal mouldings; but in rich buildings, several mouldings and alternate faces are used.

Perpendicular English Niches.



These are very numerous, as amongst them we must include nearly all the stall, tabernacle, and screen-work in the English churches, for there appears little wood-work of an older date. Many niches are simple recesses with rich ogee canopies, and cthers have overhanging square-headed canopies, with many minute buttresses and pinnacles crowned with battlements; or, in the latter part of the style, with what has been called the Tudor flower, an ornament used instead of battlements as an upper finish, and profusely strewed over the roofs, &c. of rich late buildings. The whole interior of the richer buildings of this style is more or less a series of panels; and therefore as every panel may, on occasion, become a niche, we find a great variety in shape and size, but, like those of the last style, thev may be generally reduced to one or other of these divisions.

Perpendicular English Ornaments.

The grand source of ornament in this style is panelling, indeed, the interior of most rich buildings is only a general series of it. Exclusive of this general sort of ornament, there are a few peculiar to it: one, the battlement to transoms of windows has already been mentioned. This, in works of late date, is very frequent, sometimes extending to small transoms in the head of the window, as well as the general division of the lights. Another, the Tudor flower, is, in rich work, equally common, and forms a most beautiful enriched battlement, and is also sometimes used on the transoms of windows in small work. Another peculiar ornament of this style, is, the angel cornices, used at Windsor and in Henry the VIIth's chapel, but, though according with the character of those buildings, it is by no means fit for general use. These angels have been much diffused as supporters of shields, and as corbels to support roof-beams, &c.

A great number of edifices of this style appear to have been executed in the reign of Henry VII., as the angels, so profusely introduced in his own works, and also his badges—the rose and portcullis—and sometimes his more rare cognizances, are abundantly scattered in buildings of this style.

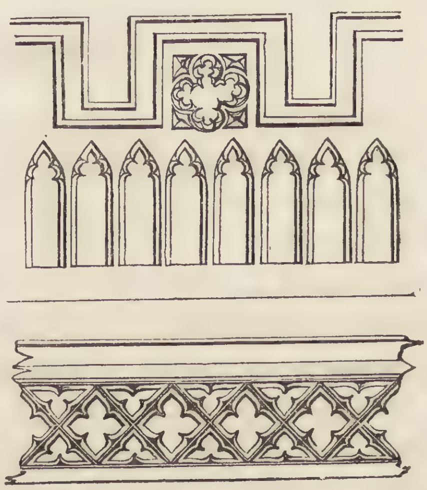
Flowers, of various kinds, continue to ornament cornices, &c., and crokets were variously formed; towards the end of this style, those of pinnacles were very much projected, which has a disagreeable effect: there are many of these pinnacles at Oxford, principally worked in the decline of the style.

Perpendicular English Steeples.

Of these there remain specimens of almost every description, from a plain short tower of a country church to the elaborate and gorgeous towers of Gloucester and Wrexham. There are various fine spires of this style, which have little distinction from those of the last, but their age may be generally known by their ornaments, or the towers supporting them. Almost every conceivable variation of buttress, battlement, and pinnacle is used, and the appearance of many of the towers combines, in a very eminent degree, extraordinary richness of execution and grandeur of design. Few counties in England are without some good examples.

There are, in this style, some small churches with fine octagonal lanterns. At York, the centre tower is a most magnificent lantern: its exterior looks rather flat, from its not having pinnacles, which seem to have been intended, by the mode in which the buttresses are finished; but its interior gives, from the flood of light it pours into the nave and transepts, a brilliancy of appearance, equalled by very few, if any, of the other cathedrals.

Perpendicular English Battlements.



Parapets still continue to be used occasionally. The trefoiled panel with serpentine line is still used, but the dividing line is oftener straight, making the divisions regular triangles. Of panelled parapets, one of the finest is that of Beauchamp Chapel, which consists of quatrefoils in squares, with shields and flowers. Of pierced battlements, there are many varieties but the early ones frequently have quatrefoils, either for the lower compartments, or on the top of the panels of the lower to form the higher; the later have often two heights of panels, one range for the lower, and another over them for the upper. These battlements have generally a running

cap moulding carried round, and generally following the line of battlement. There are a few late buildings which have pierced battlements, not with straight tops, but variously ornamented, with pointed upper compartments. Sometimes on the outside, and often within, the Tudor flower is used as a battlement.

Of plain battlements, there are many descriptions: 1st. That are of nearly equal intervals, with a plain capping running round with the outline. 2d. The castellated battlement, with nearly equal intervals, and sometimes with large battlements and small intervals, with the cap moulding running only horizontally, and with the sides cut plain. 3d. A battlement, like the additions of a moulding, which runs round the outline, and has the horizontal capping set upon it. 4th. The most common late battlement, with the cap moulding broad, of several mouldings, and running round the outline, and thus often narrowing the intervals and enlarging the battlement.

To one or other of these varieties, most battlements may be reduced, but they are never to be depended on alone in determining the age of a building, from the very frequent alterations they are liable to.

Perpendicular English Roofs.

These may be divided into three kinds: first, those open to the roof framing; second, those ceiled flat or nearly so; and, thirdly, the regular groined roof. Of the first kind, those magnificent timber roofs, of which Westminster Hall is one of the finest specimens. The beams, technically called principals, are here made into a sort of trefoil arch, and the interstices of the framing filled with pierced panellings; there are, also, arches from one principal to another. The second is in common churches, and is the perpendicular ordinary style of ceiling, rich, though easily constructed: a rib crossed above the pier, with a small flat arch, and this was crossed by another in the centre of the nave, and the spaces thus formed were again divided by cross ribs, till reduced to a square of two or three feet, and at each intersection a flower, shield, or other ornament was placed. This roof was sometimes in the aisles made sloping, and occasionally coved. In a few instances, the squares were filled with fans, &c. of small tracery. A variety of this roof, which are very seldom met with, is a real flat ceiling of the present day. The third, or groined roof, is of several kinds. Of this, it may be well to notice, that the ribs in this style are frequently of fewer mouldings than before, often only a fillet and two hollows, like a plain mullion. We see, in the groined roofs of this style, almost every variety of disposition of the ribs, and in the upper part of the arch they are, in many instances, feathered; and these ribs are increased, in the later roofs, till the whole is one series of net-work, of which the roof of the choir at Gloucester is one of the most complicated specimens. The late monumental chapels and statuary niches, mostly present, in their roofs, very complicated tracery.

We now come to a new and most delicate description of roof, that of fan tracery, of which probably the earliest, and certainly one of the most elegant, is that of the cloisters at Gloucester. In these roofs, from the top of the shaft, springs a small fan of ribs, which, doubling out from the points of the panels, ramify on the roof, and a quarter or half-circular rib forms the fan; and the lozenge interval is formed by some of the ribs of the fan running through it, and dividing it into portions, which are filled with ornaments. To some of these roofs are attached pendants, which, in Henry the VII.'s Chapel, and the Divinity School, at Oxford, come down as low as the springing line of the fans. The roof of the nave and choir of St. George's, Windsor, is very singular, and perhaps unique.

The ordinary proportions of the arches and piers is half the breadth of the nave, this makes the roof compartments two squares; but at Windsor the breadth of the nave is nearly three times that of the aisles, and this makes the figure about three squares. The two exterior parts are such as, if joined, would make a very rich ribbed roof, and the central compartment, which runs as a flat arch, is filled with tracery panels of various shapes, ornamented with quatrefoils, and forming two halves of a star, in the choir; the centre of the star is a pendant. This roof is certainly the most singular, and perhaps the richest in effect of any we have; it is profusely adorned with bosses, shields, &c.

There still remains one more description of roof, which is used in small chapels, but not common in large buildings: this is the arch roof. In a few instances, it is found plain, with a simple ornament at the spring and the point, and this is generally a moulding, with flowers, &c. but it is mostly panelled. Of this roof, the nave of the Abbey-church at Bath is a most beautiful specimen. The arch is very flat, and is composed of a series of small rich panels, with a few large ones at the centre of the compartments, formed by the piers. The roofs of the small chapels on the north side of Beauchamp Chapel, at Warwick, are also good examples; and another beautiful roof, of this kind, is the porch to Henry the VII.'s Chapel, but this is so hidden, from the want of light, as to be seldom noticed. The ribbed roofs are often formed of timber and plaster, but are generally coloured to represent stone-work.

Perpendicular English Fronts.

The first to be noticed of these, and by far the finest west front, is that of Beverly Minster, a building much less known than its great value merits it should be. Like York Minster, it consists of a very large west window to the nave, and two towers for the end of the aisle. This window is of nine lights, and the tower windows three lights. The windows in the tower correspond, in range, nearly with those of the aisles and clerestory windows of the nave; the upper windows of the tower are belfry windows. Each tower has four large and eight small pinnacles, and a very beautiful battlement. The whole front is panelled, and the buttresses, which have a very bold projection, are ornamented with various tiers of niche-work of excellent com-

position and most delicate execution. The doors are uncommonly rich, and have the hanging feathered ornament; the canopy of the great centre door runs up above the sill of the window, and stands free in the centre light with a very fine effect. The gable has a real tympanum, which is filled with fine tracery. The east front is fine, but mixed with early English.

Perpendicular English Porches.

Of these there are so many, that it is no easy matter to choose examples, but three may be noticed: first, that attached to the south-west tower of Canterbury Cathedral, which is covered with fine niches; secondly, the south porch at Gloucester, which has more variety of outline, and is nearly as rich in niches; the third is the north porch at Beverly, and this is, as a panelled front, perhaps, unequalled. The door has a double canopy, the inner an ogee, and the outer a triangle, with beautiful crokets and tracery, and is flanked by fine buttresses breaking into niches, and the space above the canopy to the cornice is panelled; the battlement is composed of rich niches, and the buttresses crowned by a group of four pinnacles.

The small porches of this style, are many of them very fine, but few equal those of King's College Chapel, Cambridge. The appearance of perpendicular buildings is very various, so much depends on the length to which panelling, the great source of ornament, is carried. The triforium is almost entirely lost, the clerestory windows resting often on a string which bounds the ornaments in the spandrels of the arches; but there is, not unfrequently, under these windows, in large buildings, a band of sunk or pierced panelling, of great richness.

Of small churches, there are many excellent models for imitation, so that, in this style, with some care and examination, scarcely any thing need be executed but from absolute authority.

The antient architecture of Great Britain being at this period in high estimation; and, by recent efforts, conducted according to the most scientific and improved principles of architecture, the face of our country, it must be admitted by all, is continually acquiring new beauty. Taste, without use and solidity, is, indeed, of little permanent value; but, when in combination with truth, it deserves and commands universal applause. These remarks are verified in the present age, by the numerous beautiful edifices rising in all parts of the country, either for the purposes of religion, benevolence, learning, or the enjoyment and convenience of mankind; and thus we may justly congratulate our country, that the improved art in building is at length discovered and practised, by uniting elegance with convenience, and rendering ornament conducive to accommodation and comfort.

PERSPECTIVE.

DEFINITIONS.

Def. 1.—Linear Perspective is the art of representing an object on a plane surface in such a manner, that if the eye, the plane, and the object, be duly posited with respect to each other, a straight line drawn from any point of that object to the eye will meet the picture in the corresponding point of the representation.

Def. 2.—The plane surface on which the representation is made, is called the *plane of the picture.*

Def. 3.—The point wherein the eye of the spectator is placed is called the *point of sight.*

Def. 4.—The point where a perpendicular, from the point of sight to the plane of the picture, meets that plane, is called the *centre of the picture.*

Def. 5.—If a plane be supposed to pass through the point of sight, parallel to the plane of the picture, that plane is called the *directing plane.*

Def. 6.—An original point, line, or plane, is a point, line, or plane, referred to the object itself.

Def. 7.—The point where a line from the object, produced, if necessary, meets the picture, is called the *intersecting point* of that line.

Def. 8.—The line in which any original plane meets the picture, is called the *intersecting line* of that plane.

Def. 9.—The point where any original line meets the directing plane, is called the *directing point* of that line.

Def. 10.—A line joining the point of sight and the directing point of an original line, is called the *director* of that original line.

Def. 11.—The line where an original plane, or its prolongation, meets the directing plane, is called the *directing line* of that original plane.

Def. 12.—A line drawn through the point of sight, parallel to any original line, is called the *radial* of that original line.

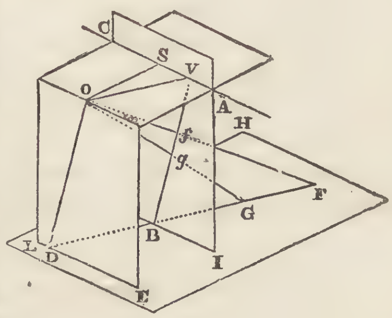
Def. 13.—A plane passing through the point of sight, parallel to any original plane, is called the *radial* of that original plane.

Def. 14.—The point wherein the radial of any original line meets the picture, is called the *vanishing point* of that original line.

Def. 15.—The line where the radial of any original plane meets the picture, is called the *vanishing line* of that original plane.

Def. 16.—The point where a perpendicular, from the point of sight to a vanishing line, meets that line, is called the *centre* of that vanishing line.

Def. 17.—The representation of any object is called the *projection* of that object.



In order to comprehend more clearly the meaning of these definitions, imagine the plane, ABC, to represent the plane of the picture (*Def.* 2), O the point of sight (*Def.* 3), the plane ODE the directing plane (*Def.* 5): F and G original points, FG an original line, and FGH an original plane (*Def.* 6): Let the original line, GF, meet the picture in BI, and the directing plane in DE; BI is the intersecting line (*Def.* 8), B is the intersecting point, and D the directing point (*Def.* 9). Again, let OAC be a plane parallel to the original plane, FGH, meeting the picture in the line AC, AC is the vanishing line of the plane, FGH, (*Def.* 15). If the line OV be parallel to the original line FG, and meet the

picture in V, V is the vanishing point of the line FG (*Def.* 14). Let FG produced meet the picture in B, and the directing plane in D, B is the intersecting point of the line FG (*Def.*7), D the directing point of the same line (*Def.* 9), and OD the director (*Def.* 10.) If OS be perpendicular to AC, meeting AC in S, S is the centre of the vanishing line AC (*Def.* 16).

AXIOMS

Axiom 1.—The common intersection of two planes is a straight line.

Axiom 2.—If two straight lines meet in a point, or are parallel to each other, a plane may pass through them both.

Axiom 3.—The three sides of a plane triangle are in the same state.

Axiom 4.—If two straight lines be each intersected by a third, the three lines are in one plane.

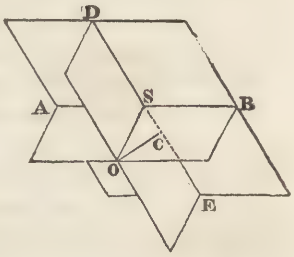
Axiom 5.—Every point in a straight line is in the same plane with that straight line.

LEMMA 1.

If the plane BSO, (see the diagram to *theorem* I.) meet the plane AEBD, in the line AB, and if from any point O, in the plane BSO, OS be drawn perpendicular to AB, meeting AB in S, if OC be drawn perpendicularly to the plane AEBD and CS joined, CS is perpendicular to AB.

THEOREM I.

A line drawn from the centre of the picture to the centre of the vanishing line is perpendicular to that vanishing line.



For, imagine AEBD to be the plane of the picture, O the point of the sight, and OSB a plane passing through the vanishing line AB, let S be the centre of the vanishing line, and C the centre of the picture. Then, since OS is drawn perpendicular to AB, and OC to the plane AEBD, meeting A in C, therefore (*Lemma* 1) OS is perpendicular to AB. Q.E.D.

Corollary.—The distance OS, of any vanishing line AB. is the hypothenuse of a right-angled triangle, one leg of which is the distance of the picture OC, and the other the distance, CS, between the centre of the picture and the centre of the vanishing line.

THEOREM II.

The representation of a straight line is a straight line.

For straight lines drawn from any number of points in a straight line, to a point given in position, are all in one plane; and, if this plane be cut by another, the common section of these planes is a straight line.

Therefore, straight lines passing from every point in an original line, to the point of sight, will cut the picture in a straight line.

THEOREM III.

The indefinite representation of a straight line, not parallel to the picture, passes through both its intersecting and vanishing points.

For the intersecting point is the representation of a point in the original line, and the vanishing point the representation of another point in the same line, but the representation of a straight line is a straight line. (*Theorem* II.) Therefore, the line joining the intersecting and vanishing points is a straight line.

Cor. 1.—The representations of all original lines, which are parallel to one another, pass through the same vanishing point, for only one line can be drawn through the point of sight which will be parallel to them all, and that line can generate only one vanishing point.

Cor. 2.—The centre of the picture is the vanishing point of all lines perpendicular to the picture.

THEOREM IV.

The representation of a line parallel to the picture, is parallel to its original.

For, because the line is parallel to the picture, a plane, which is also parallel to the picture, can be drawn

through that line: let it be done; and, suppose lines to be drawn from all the points of the original line to the point of sight, these lines will form a plane, which is intersected by two parallel planes; but, when a plane cuts two parallel planes, their common sections are parallel lines; therefore the representation is parallel to the original.

Cor. 1.—The representations of any number of lines parallel to the picture are parallel to one another.

Cor. 2.—The representation of any plane figure, parallel to the picture, is similar to the original; for rays that issue from the original to the eye form a pyramid, of which the picture is a section parallel to the base; but a section of a pyramid, parallel to its base, is similar to the base: therefore, the representation of any plane figure, parallel to the picture, is similar to the original.

THEOREM V.

The representation of a straight line is parallel to its director

For the plane that passes through the original line and the eye, will intersect both the plane of the picture and the directing plane; but the plane of the picture and the directing plane are parallel to each other. Now, the representation of the original line is the intersection of the plane passing through the original line and the eye, with the plane of the picture; therefore, the representation of the original line is parallel to its director.

Cor. 1.—The representation of all lines that have the same director are parallel to each other.

Cor. 2.—When the original line is parallel to the picture, the director is parallel to the orginal line.

Cor. 3.—If the director be perpendicular to the directing line, the representations of all original lines, which terminate in the directing point, will be perpendicular to the intersecting line.

Cor. 4.—If the director be perpendicular to the directing line, and the plane of the picture perpendicular to the original plane, then the representations of lines perpendicular to and in the original plane, drawn from the point where the perpendicular meets it, will be in one straight line, perpendicular to the intersecting line.

THEOREM VI.

The vanishing, intersecting, and directing, lines are parallel to each other.

For the directing and intersecting lines, being the sections of parallel planes, are parallel to each other; and for the same reason, because the vanishing and intersecting lines are the intersections of parallel planes, they are parallel to each other. Therefore, the directing and vanishing lines are both parallel to the intersecting line; but lines, which are parallel to the same line, are parallel to one another: hence the truth of the proposition is manifest.

THEOREM VII.

The vanishing points of all the lines in any original plane are in the vanishing line of that plane.

For, since all the original lines are in the same plane, their radials, which pass through the point of sight, will also be in a parallel plane; but this parallel plane, passing through the point of sight, produces the vanishing line; wherefore all the vanishing points are in the vanishing line.

Cor. 1.—Original parallel planes have the same vanishing line.

Cor. 2.—The vanishing point of the common intersection of two original planes, is the intersection of their vanishing lines.

Cor. 3.—The vanishing line of a plane, perpendicular to the picture, passes through the centre of the picture.

THEOREM VIII.

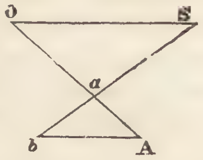
The intersecting points of all lines, in the same original plane, are in the intersecting line of that plane. This is so obvious as to require no demonstration.

Cor. 1.—The intersecting point of the line of common section of two original planes, is the intersecting point of a straight line common to, or in, each plane.

Cor. 2.—Planes which have their common section parallel to the picture, have their intersecting and vanishing lines parallel to each other.

PROBLEM 1.

Given the centre and distance of the picture, with the seat of a point, on the plane of the picture, and the distance of the point from its seat: to find the representation of that point.



Let S be the centre of the picture, and b the seat of the point; draw SO at pleasure equal to the distance of the picture, and let bA be drawn parallel to SO, and equal to the distance of the point from its seat. Join bS and AO; and the point a of intersection is the representation required.

DEMONSTRATION.

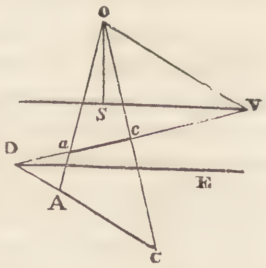
For if the triangle O S b, and, consequently, A b S, had been a right-angle; by turning the triangles S O a and b A a round the line S b, as an axis, till S O and b A become perpendicular to the picture, O would be the point of sight, and A the original point. AO would be the visual ray, intersecting the picture in a, which would be the representation of the point A (by *Theorem* II); but the point a is the same, whatever be the species of the angle O S b; because the triangles O S a and A b a are similar. Hence Sa : ab :: SO : bA; which proportionality is not affected by any change of magnitude that may take place in the angle O S b; therefore, in all cases, the point a, thus found, is the representation required.

Cor. 1.—Hence OS + bA : Sa + ab :: Ab : ba

Cor. 2.—By this proposition the representation of any line may be found; for having found the representations of any two points in that line, we have only to draw a line through the representations thus found.

PROBLEM 2.

Given the seat of a line, its intersecting point, the angle it makes with its seat, and the centre and distance of the picture; to find the vanishing point and the representation of that line.



Let DE be the seat of the line, D its intersecting point, and S the centre of the picture.

Draw DC, making with DE an angle, equal to that which the original line makes with its seat. Draw SV parallel to DE, and SO perpendicular to SV, making SO equal to the distance of the picture. Draw OV parallel to DC, meeting SV in V, then will V be the vanishing point, OV its distance from the point of sight, and DV the representation of the line proposed.

DEMONSTRATION.

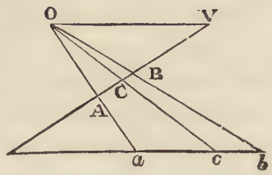
Imagine the planes OVS and CDE to be turned round on the lines SV and DE as axes, till they become perpendicular to the picture; then will O be the point of sight, and DC the original line parallel to OV. V is its vanishing point (*Def.* 14), and, consequently, DV is the indefinite representation. Q.E.D.

Cor.—Conceive DC to be the original line laid on the picture, by turning the plane CDE round the line ED. The representation of any part of it, as AC, may be found, by drawing AO and CO as visual rays, intersecting DV in the points $a\,c$; as the points $a\ c$ depend only on the parallelism and proportionality of the lines OV and DC.

For aV : aD :: VO : DA, and cV : cD :: VO : DC. These analogies arising from the similarity of the triangles aV O, aD A; as also cV O and cD C.

PROBLEM 3.

Given the representation of a line and its vanishing point, to find the representation of a point, whose original divides the original line in a given ratio.



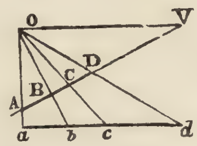
Let AB be the representation of the line whose division is required, and V its vanishing point. Draw, at pleasure, VO, and *b a* parallel to VO. Through any point, O, in the line VO, draw OA and OB, intersecting *ba* in *a* and *b*. Divide *a b* in *c*, in the given ratio, and draw O *c*, intersecting AB in C; then will C be the representation required: the original of BC being to the original of CA as *b c* to *c a*.

DEMONSTRATION.

OV being parallel to *b a*, *b a* may be considered as the original line, and OV as its parallel; and, consequently, O as the point of sight, and *a* O, *b* O, *c* O, as visual rays, generating the points ABC.

PROBLEM 4.

Given the representation and vanishing point of a line, together with a point in that representation, to find another point in the representation, which, with the one given, shall intercept a line, whose original shall have a given ratio to the original of the given representation.



Let AB be the given representation, V its vanishing point, and C the point given, which, with another point to be found, intercepts the required portion of AV.

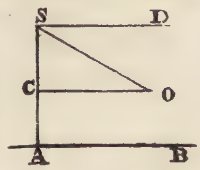
Draw VO, at pleasure, and let *a d* be drawn parallel thereto. From any point, O in VO, draw OA, OB, OC, meeting *a d* in the points *a*, *b*, and *c*. Make *c d* to *a b*, as the part represented by AB is to the required intercept, and draw O *d*, cutting AV in D; then will D be the required point. For the original of CD is to the original of AB as *c d* is to *a b*.

DEMONSTRATION

If OV be conceived as the vanishing line of a plane, passing through the original of AV, *a d*, being parallel to it, may be considered as the representation of a line parallel to the picture (*Cor.* 2, *Theor.* V.); and, therefore, its parts, *a b* and *c d*, will have the same ratio as their originals. (*Theor.* IV.) But, because of the vanishing point, O, the originals of O *a*, O *b*, O *c*, and O *d*, are parallel (by *Cor.* 1, *Theor.* III.); wherefore, the original of CD is to the original of AB as *c d* to *a b*. Q.E.D.

PROBLEM 5.

Given the centre and distance of the picture, the intersection and angle of inclination of a plane, to find the vanishing line of that plane, with the centre and distance of the vanishing line.



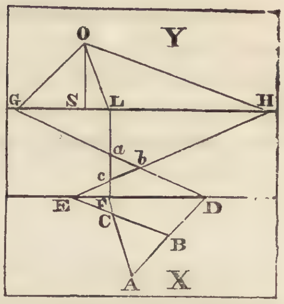
Let C be the centre of the picture, and AB the intersecting line of the given plane. Draw CO parallel to AB, and equal to the picture's distance. Through C draw AS perpendicular to AB, and make the angle OSC equal to the inclination of the plane and picture. Draw SD parallel to AB, then will SD be the vanishing line required, S its centre, and OS its distance.

DEMONSTRATION.

Imagine the triangle OCS to be turned on CS as an axis, so that OS may be perpendicular to the picture then O will be the point of sight; and SD being parallel to AB, a plane passing along SD and O will be parallel to the original plane, passing along the line AB, and inclined to the picture in the angle OSC: wherefore SD is the vanishing line required. OS, in that supposition being perpendicular to SD, S is the centre, and SO the distance of the vanishing line. Q.E.D.

PROBLEM 6.

Given the intersecting and vanishing lines; the centre and distance of the vanishing line, with a figure in the original plane. To find the representation of that figure.



Method the first.—Let ED be the given intersecting line, GH the vanishing line, and S its centre. Draw SO perpendicular to GH, and make SO equal to the distance of the vanishing line GH.

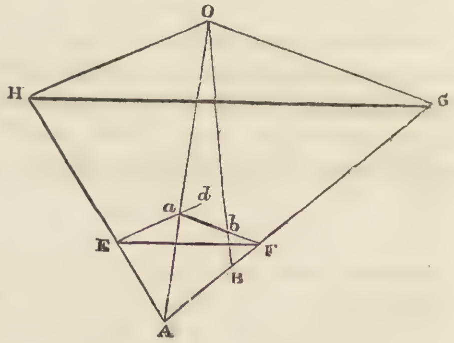
Suppose the space X, the original plane, to be turned on the line ED, as an axis behind the picture, and the plane Y to be turned on the line GH, as an axis before the picture, so as to be parallel to the plane X. Suppose, now, that AB is an original line in the plane X, of which the representation is required.

Produce AB to meet the intersecting line ED in D, and draw OG parallel to AB, meeting the vanishing line in G. Join DG, and DG will be the indefinite representation of AB. Through A and B draw, at pleasure, AC and BC, and, as before, find their indefinite projections, FL and EH intersecting DG in the points *a* and *b*; then will *a b* be the definite representation of AB.

DEMONSTRATION.

Imagine the planes X and Y to be turned round the lines ED and GH, as axes, till they become parallel to each other. Then, whatever may be the angle which the plane of the picture makes with the original plane, OG will always be parallel to AB; and, consequently, D will be the intersecting point of the line AB, G the vanishing point, and DG its indefinite representation. (*Theor.* III.) Also, the point *a*, found by the intersection of FL with DG, is the representation of the point A.

Method the second.—Suppose AB to be an original line given. Having found its indefinite representation DG, as before, draw OA and OB, intersecting DG in *a* and *b*: then will *a* and *b* be the representations of A and B, the extremities of the original line AB, and the figure may be completed, as before.



Method the third, by Directors.—Let EF be the given intersecting line, HG the directing line, the distance between EF and HG being equal to the distance of the given vanishing line.

Let O be the point of sight in the directing plane, HOG, which, at present, for the operation, is supposed to be turned on HG, till it fall on the original plane. Again, let AB be a line in the original plane, which is also supposed to turn on the intersecting line, EF, till its plane fall on the original plane. Then, to find the representation of AB.

Produce AB, to meet the intersecting line, EF, in F, and the directing line, HG, in G. Join GO, and draw F*a* parallel to GO; then F*a* will be the indefinite representation of AB, as required.

If, from the point A, we draw any straight line, AE and find the indefinite representation, E*a*, in the same manner as F*a* was found, then the intersection, *a*, of these indefinite representations will be the representation of the original point A; and, in the same manner, the representation, *b*, of the original point, B, may be found, and the figure completed, as before.

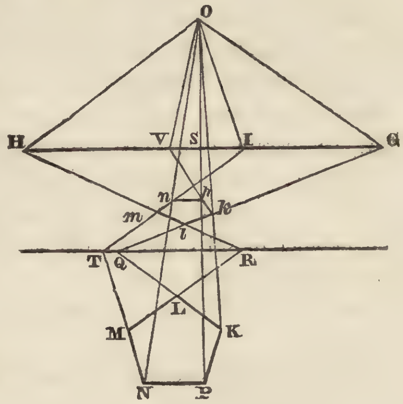
DEMONSTRATION.

Suppose the plane of the picture *a*EF to revolve on the line EF, and the plane HOG on the line HG, as axes, so as to be parallel to each other, and both elevated above the original plane, which is comprehended between the directing and intersecting lines HG and EF. Then O will be the point of sight, F the intersecting point of the original line AB, and G its directing point; but, whatever be the angles which the plane of the picture and the directing plane make with the original plane, they will always be parallel. Therefore, F*a* will be the indefinite representation of AB, (*Theor.* V,) and E*a* the indefinite representation EA; and consequently, the point *a*, is the representation of the point A.

PROBLEM 7.

The same data being given, as in Problem 6, to find the representation of any figure in the original plane

Example 1.—Let it be required to find the representation of the pentagon KLMNP.

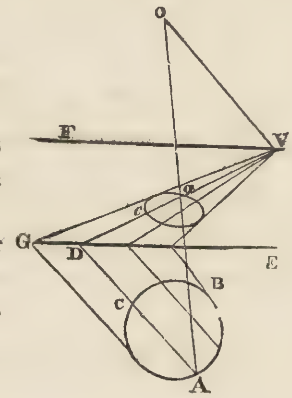


Draw OG, OH, OI, and OV parallel to KL, LM, MN, and KP, meeting HG in the points G, H, I, and V, which are the vanishing points of the lines KL, LM, MN, and KP.

Produce KL, LM, MN, to their intersecting points, Q, R, and T. Draw QG, RH, and TI, intersecting each other in the points *l, m*, which are the representations of the points LM. Join OK, ON, intersecting the indefinite representations QG, TI, in the points *k* and *n*. Draw *k* V, which is the indefinite representation of KP. Lastly, draw OP, intersecting *k* V, in *p*; and *p* is the representation of P.

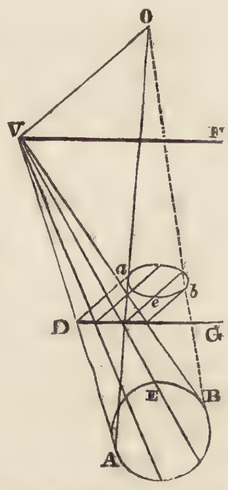
The representations of curve-lined figures, are obtained by finding the representations of a sufficient number of points, and joining them neatly by the hand.

Example 2, *by a Vanishing Point.*—Let FV be the vanishing line, GE the intersecting line, O the point of sight, and the original figure, ABC, a circle. Then the representation *a* of any point, A, may be found thus.



Through A draw AD, at pleasure, meeting GE in D; and draw OV parallel to AD, meeting FV in V. Join DV and AO, intersecting each other in *a*; then *a* is the representation of the point A.

In finding the representations of the other points in the circle, much labour may be saved by drawing lines through all the points parallel to AD, for then one vanishing point will serve for ascertaining the representations of as many points in the original figure as are necessary



Or, by a Directing Point, thus:—Let VF be the directing line, O the point of sight, and DG the intersecting line, AEB the original plane.

Draw AV, at pleasure, meeting DG in D, and VF in V. Join OV, and draw D *a* parallel to VO, and let OA intersect D *a* in *a*. Then *a* is the representation of A.

And as many points as may be thought necessary may be found in the same manner; but much labour will be saved by employing the same vanishing point for all the points in the circumference. In this case, the indefinite representations will be parallel to D *a*.

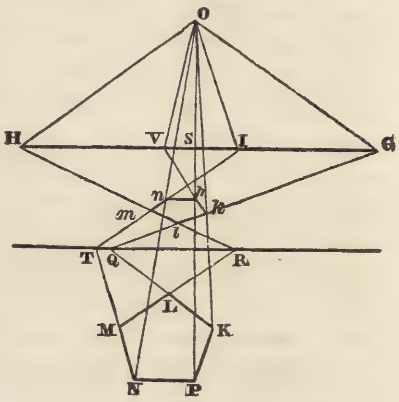
PROBLEM 8.

To find the representation of any figure in a plane parallel to the picture. The representation being similar to its original, (by *Cor.* 2, *Theor.* IV,) we have only to find the representation of one line of the original figure, and on that line, as a side, construct a figure whose homologous sides shall have the same ratio as those of the original figure

PROBLEM 9.

Given the intersecting and vanishing lines, the centre and distance of the vanishing line, with the representation of a figure. To find the original of that figure, whose representation is given.

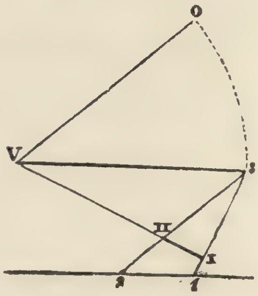
Let it be proposed to find the original of the pentagon $klmnp$. Produce the sides till they meet the intersecting line, in the points Q, R, T, and the vanishing line in the points G, H, I; and produce kp to its vanishing point, V. Draw OG, OH, OI, OV, and QK, RM, IN, parallel to the first three respectively, meeting in L and M, which will be the originals of l and m. Draw Ok and On, which will meet QL and TM in the original points, K and N. Then draw KP parallel to OV; and let Op be also drawn, meeting KP in P, which is the original of p.



Lastly, draw NP, and we shall have KLMNP the original of $klmnp$.

This problem being the reverse of Problem 7, the truth of the construction is manifest.

PROBLEM 10.

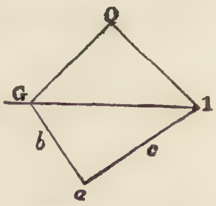


The same data being given, to find the original of one representation only.

Produce I, II, to its vanishing point V; and draw VO. In the vanishing line take V 3 equal to VO. Join 3I, 3II, which produce to the intersecting points, 1, 2. Then will 1, 2 be the length required of the original I, II.

PROBLEM 11.

Given the vanishing line, its centre, and distance, with the representation of a line. To find the representation of another line, so that the originals of the two lines shall contain a given angle.



Let G1 be the vanishing line, O the point of sight, and ab the representation given.

Produce ab to its vanishing point, G. Join GO, and make the angle GO1 equal to the given angle, and draw $1\,ca$, which will be the line required.

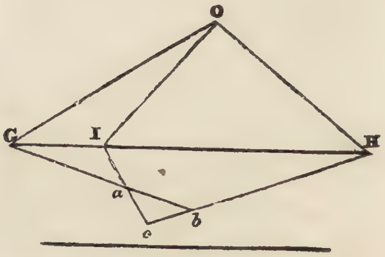
DEMONSTRATION.

This is evident from *Def.* 14, and from *Theor.* III; for the radials of two original lines which form an angle, make an angle equal to that of the originals. Then bac is the representation of that angle.

PROBLEM 12.

Given the vanishing line, its centre and distance, with the representation of one side of a triangle, whose species is given. To find the representation of the whole triangle.

Let ab be the given representation, which produce to its vanishing point, at G. Join GO, and make the angle GOI equal to the angle, which the side of the original triangle, whose representation is given, makes with the other side, terminating in the same point Draw OH to make an angle equal to the obtuse angle of the triangle. Join Hb, which produce to c; then will abc be the representation required.



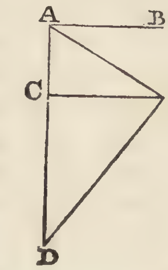
PROBLEM 13.

Given the vanishing line, its centre, and distance, with the representation of one side of any figure To find the representation of the whole figure.

Resolve the figure into as many triangles as it has sides, by diagonals drawn from the nearest angle to all the other angles; then find the representations of these triangles one after another.

This may be done otherwise, by the application of the preceding problems.

PROBLEM 14.



Given the centre and distance of the picture, with the vanishing line of a plane, to find the vanishing point of lines perpendicular to that plane.

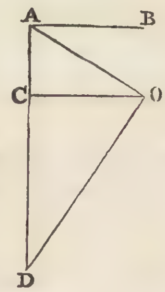
Let AB be the given vanishing line, and C the centre of the picture. Through C draw AD, perpendicular, and CO parallel, to AB. Make CO equal to the distance of the picture. Join AO; and draw OD perpendicular to AO. Then D is the vanishing point of the lines required.

DEMONSTRATION.

Suppose the triangle AOD to be turned round AD, as an axis, until its plane becomes perpendicular to the plane of the picture. This done, the plane, passing through the point of sight O, and the vanishing line AB, will be parallel to the original plane; and the line OD will be perpendicular to this plane, passing through the point of sight, and, consequently, will be parallel to lines which are perpendicular to the original plane. Therefore D is the vanishing point of these lines.

Cor.—The original plane is perpendicular to the picture, when the vanishing line AB passes through its centre. In this case, the vanishing point D will be infinitely distant, and the representations sought, perpendicular to AB.

PROBLEM 15.



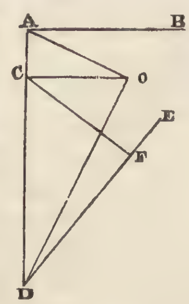
Given the centre and distance of the picture, with the vanishing point of parallel lines. To find the vanishing line of a plane, whose original is perpendicular to the original parallel lines.

Let C be the centre of the picture, and D the vanishing points of parallel lines.

Through C draw DA, and let CO be perpendicular to DA. Make CO equal to the distance of the picture. Join DO; draw OA perpendicular to DO; and, through A, draw AB parallel to CO. Then AB will be the vanishing line required, A its centre, and OA its distance.

This construction necessarily follows from the preceding problem.

PROBLEM 16.



Given the centre and distance of the picture. with the vanishing line of parallel planes. To draw through a given point another vanishing line of a plane which is perpendicular to that plane, whose vanishing line is given; and to find the centre and distance of the vanishing line thus drawn.

Let AB be the given vanishing line, C the centre of the picture, and E the given point.

Find (by *Prob.* 14.) the vanishing point D, of lines perpendicular to the original plane, whose vanishing line is AB.

Join DE, which is the vanishing line required. Draw CF perpendicular to DE, meeting it in F, and F is the centre of the vanishing line DE (by *Theor.* I).

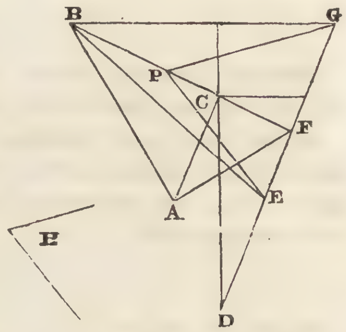
With CF, as a base, and the distance of the picture as a perpendicular, draw a right-angled triangle; then the hypothenuse is the distance of the vanishing line required.

DEMONSTRATION.

Because the plane, whose vanishing line is required, is perpendicular to the other, whose vanishing line is given, its vanishing line must pass through the point D. Q.E.D.

PROBLEM 17.

Given the centre and distance of the picture, the vanishing line of the common intersection of two planes, inclined at a given angle, and the vanishing line of one of them, to find the vanishing line of the other.



Let C be the centre of the picture, BG the given vanishing line of one of the planes, B the vanishing point of their common intersection, and H the angle of their inclination.

Find the vanishing line, GD, of planes perpendicular to the lines whose vanishing point is B, (by *Prob.* 15,) and let that vanishing line cut the vanishing line given in G. In GD find the point E of lines, making a given angle, H, with the lines whose vanishing point is G, (by *Prob.* 11,) that is, in BCF, which is perpendicular to GFD; make FP equal to the distance of the vanishing line, GD; and draw PG and PE, making the angle EPG equal to H; and draw BE, which is the vanishing line required.

DEMONSTRATION.

Draw CA perpendicular to BF, and equal to the distance of the picture, and join AF and AB; then will AF be equal to FP. Imagine the triangle, BAF, to bet urned on BF, until its plane be perpendicular to the picture. Imagine, also, the triangle, GPE, to be turned round GE, until FP coincide with FA; and the planes BPG, DPB, will be parallel planes of the originals, whose vanishing lines are BG, GD, DB. Q E.D.

EXAMPLES.

In the application of Perspective to figures in the original plane, to save repetition in describing the diagrams VL is the vanishing line, IN the intersecting line, C the centre of the picture, in the vanishing line VL. CP is drawn perpendicular to VL, and equal to the distance of the picture. (*Fig.* 1, *Plate* LXX.)

The space below the intersecting line, IN, is supposed to be the original plane. The space above the vanishing line, VL, may either be considered as a continuation of the picture upwards, or the plane which passes through the eye parallel to the original plane.

Ex. 1.—To find the representation of a point A. (*Fig.* 2, *Plate* LXX.)

In CP make PD equal to the height of the eye. Draw A*f* towards D, meeting IN in *f*. Through A draw any line, AI; and draw Pa parallel thereto, meeting the vanishing line in a; and join Ia. Draw a perpendicular to IN, from *f*, to meet Ia; and the point of intersection will be the representation of the original point A.

Here the point D is used as a directing point; and where it appears in the subsequent diagrams, it is used for the same purpose.

Ex. 2.—To find the vanishing point of an original line, AB. (*Fig.* 2.)

Draw Pa parallel to AB, meeting the vanishing line in a; then a is the vanishing point required.

Ex. 3.—To find the intersecting point of a given line, AB. (*Fig.* 2.) Produce BA to meet the intersecting line in I; then I is the point required.

Ex. 4.—To find the indefinite representation of the line, AB. (*Fig.* 2.) Find the vanishing point a, (as in *Example* 2,) and the intersecting point *d*, (as in *Example* 3.) Join a*d*, and a*d* will be the representation required.

Ex. 5.—An original line, AB, (*Fig.* 2,) a point in that line, and the indefinite representation, a*d*, being given; to find the representation of the point.

Draw A*f* towards D, meeting the intersecting line in *f*, and draw *fa* perpendicular to IN, meeting the indefinite representation a*d* in *a*; then *a* is the representation of the point A, as required.

Hence we may find the representation of a line, AB, limited at both ends.

Ex. 6.—To find the representation of any plane figure.

Find the indefinite representation of all the sides, and the space enclosed by these representations will be the representation of the figure.

Figure 3 shows the representation of a triangle: *fig.* 4 the representation of a square; and *fig.* 5 the representation of a hexagon.

Ex. 7.—To find the representation of a circle. (*Fig.* 6.)

Find the representation, *a b c d*, of a square, circumscribing the circle; draw the diagonal of the trapezium which represents the square; find the representation of two lines, touching the circle in E and F: and the representations, *e* and *f*, of these points, with the intersection of the two diagonals of the trapezium, is in the representation of the circle. Draw a line to each vanishing point of the square, through the representation of the centre, to cut or meet each line of the representation of the sides.

Through the four points of the trapezium, and the two points *e* and *f*, describe an ellipse, which will be the representation required.

Ex. 8, *fig* 7, shows the representation of a circle, by drawing parallel lines through the figure, and finding the indefinite representation of these lines, with the representations of the points where the parallels cut the original circle. An ellipse being described through the points thus found, will be the representation of the circle.

Ex. 9.—*Fig.* 1, *pl.* LXXI, exhibits the representation of a rectangular block, as it would appear if placed on the ground, and also as it would appear if placed above the level of the eye. The heights are set off on the perpendicular, *f e*, from the intersecting point, *e*.

Ex. 10.—To find the representation of a square pyramid.

Let ABCD, (*fig.* 2,) be the plan. Produce DA to its intersecting point *e*, and draw *g* parallel to DA. Find the representations of the sides AD and AB by the preceding examples. From the centre of the plan, *g*, draw a line to the directing point D: and from the point where this line cuts the intersecting line, IN, raise an indefinite perpendicular; also, draw *hf* perpendicular to IN, and equal to the height of the pyramid. From *h*, draw a line to the vanishing point V, cutting the indefinite perpendicular in *g*; then *g* is the vertex of the pyramid; and join *g d*, *g a*, and *g b*, which will complete the representation.

Ex. 11.—To find the representation of a frustum of a square pyramid, *fig.* 3.

Find the representation of the entire pyramid, as in the last example; and let *e f g h* be a plan of the top of the frustum. Draw *ef* to its intersecting point *m*, and make *m n* perpendicular to IN, and equal to the height of the frustum. From *n*, draw a line to the vanishing point V, which will give *ef*, the edge of the frustum; and from *f* draw, to the other vanishing point, L, the line *fg*, which completes the frustum.

Ex. 12.—To find the representation of a cone, *fig.* 4.

Find the representation of the base, as in the example (*fig.* 6, *pl.* LXX.); and the representation of the vertex (as in *Example* 10). Then join *o m* and *o n*, which complete the picture of the cone.

Ex. 13.—*Fig.* 5, *plate* LXXI, is a representation of a wall, with a semi-octagon tower projecting from it. Towers of this kind are very common in Gothic buildings.

Ex. 14.—*Fig.* 6 shows an example of a round tower joining a straight wall

These two examples may be considered as exercises of the application of the rules already given.

Ex. 15.—To find the representation of a flight of returning steps. (*Fig.* 1, *plate* LXXII.)

Produce the lines that form the boundary, and the lines that divide the steps on the plan to their intersecting points, *e*, *f*, *g*, and find the vanishing points of these lines. From the points *e*, *f*, *g*, draw perpendiculars to the intersecting lines. On each of these perpendiculars set the respective heights of the steps, and draw lines from the extremities of each to the vanishing point.

Find the termination of each face by the perpendicular lines, as seen in the figure, and also the vanishing point of the other side. Draw lines to this point from the corners of the faces, which lines will represent the heights. Find the terminations of these faces; then the returning lines being drawn to each vanishing point, will complete the representation of the steps as required.

Ex. 16.—*Fig.* 2 is the representation of a flight of steps, with kirbs at the ends. The perspective heights are found, by finding a section of the steps on the plane of the picture, and the lengths are found by the directing point D.

Ex. 17.—*Fig.* 3 is the representation of a square tower. The first thing to be done is to find a section of the face, as shown by a dark line. Set the heights of the door and windows upon this line, and draw lines from the points of the section to the vanishing points of that side of the plan. By this mean, all the projecting parts, as cornice and plinth, will be found. Then, having found the perspective breadth of the front, the terminations of the cornice, and breadth of the windows, the front will be finished.

The return end will be found in a similar manner to the last two examples.

Ex. 18.—To find the representation of a tower and spire.

Our first object is to find the representation of the rectangular part, and on this draw the perpendicular lines that represent the angles of the octagon. Produce DA, (*fig.* 4,) on the plan, to L, its intersecting point. Draw LU perpendicular to IN. Set off the height of the tower and pediment on LU. Draw lines from these heights to the vanishing point V. As the vertex of the pyramid is not in the same plane with the front, draw YP through the centre of the plan, parallel to the front line AD, meeting IN in P. Draw PR perpendicular to IN. Set the height of the spire from the ground on PR, and draw RV. Draw a line from Y to D, meeting IN; and, from the point of meeting, draw a perpendicular to the intersecting line, and the point where it meets RV is the vertex of the pyramid.

The sides of the spire are found by drawing lines from points in the lines, *a d, a d,* which represent the angles on the plan.

Ex. 19.—*Fig* 5 represents an arcade, or range of arches. The pillars are drawn, like as many square towers, of a certain height. The arches are found by circumscribing a rectangle on each, drawing the diagonals, and making the heights of the points, *r, q, m, l,* double the heights of the arches; then drawing lines to each of these points, from the chord line of each arch, to cut the diagonals. The elliptic heads will pass through these points, and through the points where the perpendiculars meet the top side of the representation of the rectangle.

The circular heads of the inner face are drawn in the same way. The cornice and plinth are drawn as in the square tower, *figure* 3.

Ex. 20.—*Fig.* 6 exhibits the representation of a square tower, consisting of different stages. Of this nothing can be said more than what has already been explained, and what will be understood by the lines in the drawing.

Ex. 21.—*Plate* LXXIII. shows the representation of a denticulated cornice. The profiles of the mouldings, in the representation, are found by means of the section, in dark lines, and the terminations, or lengths, are found as in the preceding examples. In this example the plan is above the representation; an arrangement which shows the relations of the lines in a more evident manner, and which, in some cases, is more convenient than placing it below.

Ex. 22.—*Plate* LXXIV. exhibits the representation of a house, with a cantiliver cornice.

The heights of the mouldings and pediment are found from the line of heights, which is the intersection of a plane passing through the ridge of the roof: the heights of the steps may also be found from the same. The vertical lines which terminate the fronts, the breadth of the windows, and the chimney shaft, may be found from the plan, which is placed above the perspective drawing for the convenience of drawing the perpendiculars, from the intersecting line, AD, to the several terminations of the representation.

Through the oblique lines of the pediment may be drawn the two ends of each inclined cornice. They will, however, be more elegantly found by means of Problem 14.

Ex. 23.—*Plate* LXXV, *Perspective, Grecian Doric.* This plate is a representation of the Grecian Doric

and entablature in perspective, with a geometrical outline of the mouldings. It illustrates the use of perspective, in showing the manner of finishing the parts of this chaste and simple order, in a case where it is difficult to render it intelligible by geometrical drawings alone. A good perspective representation has nearly the same advantages as a model in such cases.

Ex. 24.—*Plate* LXXVI, *Ionic Capital in Perspective*. This is another example of the use of perspective in elucidating the disposition of parts, which are often not clearly understood by those who have not an opportunity of examining good specimens of the orders.

Ex. 25.—*Plate* LXXVII, *Corinthian Order*. It is evident from the principles of Perspective, that there is only one point from whence a picture can be seen in its true form, and that point is the point of sight. (*Def.* 3.) If the point of sight be made too near to the plane of the picture, the eye cannot take in all its parts at once; and, consequently, the picture cannot produce an agreeable effect as a whole. The representation is also distorted and unnatural, from the parts diminishing too rapidly. The distance of the point of sight, from the plane of the picture, which is best suited to the power of the eye, is between two and three times the breadth of the picture. The distance most commonly adopted by artists of taste, is about two and a half times the breadth.

PROJECTION.

THE most useful kinds of architectural drawing depend upon the Theory of Projection, and, consequently, its principles ought to form a part of that stock of knowledge which is essential to a student in architecture.

Some of the principles of projection are so easily comprehended, that they are acted upon without previous study; others are so difficult, that few are competent to apply them. For example, the plan of a building is a projection of it on a horizontal plane; and an elevation of a building is its projection on a vertical plane. In these simple operations no difficulties occur; but there are many cases which arise in carpentry, joinery, and masonry, where a profound experience in projection is required.

To a workman, skill in projection is a great acquisition; it enables him to form a clear conception of intricate forms, and to foresee how different parts will join or connect with each other. It enables him to understand drawings and designs with readiness, and to work to them with certainty and accuracy.

The doctrine of shadows depends on the principles of projection, and the advantage of knowing how to shadow properly is so evident that we need not say more on the subject.

But there is another application of the art of projection, which is less generally understood, that is, as a mode of representing such objects as are always caricatured in attempting to draw them in perspective. To this class of objects belong all *small* models, machines, pieces of furniture, and the like; for such objects, projection is the most simple and convenient mode of representation.

Maps and plans, of various kinds, are drawn by the rules of Projection; and the use of these rules is extensive in many arts and sciences. We shall, however, confine ourselves to its principles and application to architectural subjects.

DEFINITIONS.

1.—If a perpendicular be let fall from a point to a plane, the place where the perpendicular meets that plane is the *projection* of that point.

Hence, as lines, surfaces, and solids, may be conceived to be composed of points, they may be projected upon a plane.

2.—*A plane of projection* is that plane on which the projection is to be made. It is also called the plane of representation.

3.—When a projection is made on a horizontal plane, it is called the *plan* of the object.

4.—When the projection is made on a vertical plane, it is called the *elevation* of the object.

5.—When the projection exhibits an object, as it would appear if cut by a vertical plane, the representation is called a *section.*

6.—A *primitive plane* is that which contains a point, a line, or a plane surface, of a given object.

PROPOSITION.

The projection of a straight line is a straight line. If the given straight line be parallel to the plane of projection, it is projected into an equal straight line; but, if the given line be inclined to the plane of projection, the given straight line will be to its projection, as the radius is to the co-sine of the angle of inclination.

Solution.—Let a plane, perpendicular to the plane of projection, pass through the given straight line. The intersection of that plane, with the plane of projection, will be a straight line, (*Euclid,* 3 *prop.,* XI. *book,*) and (*Def.* 1,) the intersection contains the projection of the given line.

From each extremity of the given line, AB, (*fig.* 1, *pl.* LXXX,) let fall a perpendicular to the intersecting line, IL; then, the part of that line, intercepted between the perpendiculars Aa, Bb, is the projection of the given line. If the given line be parallel to the plane of projection, then, because the perpendiculars are parallel to each other, and the given line parallel to the intersecting line, the projection must be equal to the given line. If the given line be inclined to the plane of projection, and AB, (*fig.* 1,) be that line, IL the intersecting line, and $a\,b$ the projection intercepted between the perpendiculars Aa and Bb. Draw BC parallel to IL, and the angle ABC will be equal to the angle of inclination of the given line to the plane of projection. Now AB being the radias, BC, or its equal, $b\,a$, is the co-sine of the angle of inclination; therefore AB is to $a\,b$ as the radius is to the co-sine of inclination.

Cor. 1.—The projection of a straight line, perpendicular to the plane of projection, is a point.

Cor. 2.—If several straight lines, having the same inclination to the plane of projection, be projected, each of the originals will have to its projection the same ratio.

Cor. 3.—A plane angle, parallel to the plane of projection, is projected into an equal plane angle.

Cor. 4.—A plane angle, inclined to the plane of projection, is projected into an angle of which the sine is reduced in the ratio of the radius to the co-sine of inclination.

Cor. 5.—Lines which are parallel in the original are parallel in the projection.

Cor. 6.—Any plane figure, parallel to the plane of projection, is projected into an equal and similar figure.

Cor. 7.—The area of any plane figure is to the area of its projection, as the radius is to the co-sine of its inclination to the plane of projection.

Cor. 8.—The projection of a circle inclined to the plane of projection is an ellipse, of which the transverse diameter is equal to the diameter of the circle; and the conjugate diameter is to the diameter of the circle, as the co-sine of inclination is to the radius.

PROBLEMS.

Problem 1.—To find the projection of a point, situate in a plane inclined to the plane of projection in a given angle.

Let IL (*fig.* 2) be the intersecting line of the two planes, and A the given point. From A draw Aa perpendicular to IL. Make wVa equal to the angle of inclination of the two planes, and Vw equal to VA. From w draw a line parallel to IL, intersecting Aa in a; then a is the projection of the point A.

Illustration.—Conceive DLIC to be the plane of projection, and LEFI the plane, containing the point A; and that these planes turn on the line IL as an axis. Also, let the triangle V*aw* turn on the line *a*V, as an axis, till it be perpendicular to the plane of projection DI, and turn the plane EI on IL, as an axis, till AV coincides with *w*V; then *aw* is obviously a perpendicular from the plane of projection to the given point; and therefore *a* is projection of A.

Remark.—It is often necessary in practice to make all the projections of an object on the same sheet of paper, or on the same area; therefore, we conceive all the planes to be spread out, or laid flat in one and the same plane; and, when we wish to consider them in their true positions, we imagine them to revolve on their intersecting lines as axes. It is for this reason that Monge, a celebrated French author on this subject, very properly recommends that the intersecting lines should be drawn in a distinct manner.

Problem 2.—To find the projection of a line situate in a plane, inclined to the plane of projection in a given angle.

Let IL (*figures* 3 and 4,) be the intersecting line of the two planes, and AB the given line. From the extremities of AB draw A*a* and B*b*, perpendicular to IL. Make *b*V*w* equal to the angle formed by the planes, and find the projection of the point B, (as in *Problem* 1.) Then, if the line be inclined to the intersecting line, (as in *fig.* 3,) produce AB, till it meets the intersecting line IL, in L. Join L*b*, and *ab* will be the projection of AB.

If the given line be parallel to IL, (as in *fig.* 4,) from *b*, found as before, draw a line parallel to IL, meeting A*a* in *a*, and *ab* is the projection of AB.

Problem 3.—To find the projection of a plane curve, situate in a plane, which is inclined to the plane of projection in a given angle.

Let IL (*fig.* 5) be the intersecting line of the two planes, and ABCD points in the curve, the number of which may be increased at pleasure. Draw a line, ACL, to touch the curve at C; and find the projection of this line, and of the points G, H, where it is crossed by lines drawn from D and B to V. Draw D*d*, C*c*, and B*b*, perpendicular to IL; and from V draw *h*V, *g*V, produced to meet the perpendiculars in *d* and *b*; then the points *a*, *b*, *c*, *d*, are the projections of the points A, B, C, D, in the curve; and a curve drawn through *abcd* will be the projection required.

Another Method.—Let IG, (*fig.* 2, *Plate* LXXXI,) be a line drawn in the same plane with the curve, and let HI be the projection of that line, found by *Prob.* 2. From any point, A, in the curve, draw a line parallel to IL, cutting it in *k*. Make *kn* and A*a* perpendicular to IL, the former meeting HI in *n*. From *n* draw a line parallel to IL; and the point *a*, where it meets A*a*, is the projection of the point A. The projections of any other points, B, C, D, E, being found in the same manner, the curve drawn through them will be the projection of the given curve.

Problem 4.—To find the projection of a plane angle situate in a plane, which is inclined to the plane of projection in a given angle.

Let IL (*fig.* 6, *plate* LXXX,) be the intersecting line, and ABC the given angle. Determine the projections of the lines AB, AC, by *Prob.* 2; and the angle *abc* will be the projection of ABC.

The projection of a plane triangle is found in the same manner, being completed by joining the points *bc* as shown by dotted lines in the figure.

The projection of a parallelogram is also effected in a similar manner. For let the angle ABC, (*fig.* 7,) be projected by the last problem; and draw *ad* parallel to *bc*, and *dc* parallel to *ab*; then *abcd* is the projection of the parallelogram ABCD.

Problem 5.—To find the projection of a pentagon, situate in a plane which is inclined to the plane of projection in a given angle.

Let a pentagon, ABCDE, (*fig.* 8,) be described, and project the side AE by Problem 2. Produce ED AD, BD, and BC, to the intersecting line; and from the points of intersection to *a*, draw *ac* and *ad*, also from the points of intersection, draw *db* parallel to *ea*, *ed* parallel to *ac*, and *bc* parallel to *ad* Join *ab*; and the figure, *abcde*, is the projection of the pentagon ABCDE

Problem 6.—To find the projection of a circle.

Let IL (*fig.* 1, *plate* LXXXI,) be the intersecting line, and HI the projection of any line, GI. Perpendicular to IL draw lines, A*a*, D*d*, &c. from as many points in the circle as may be considered sufficient; and from the same points draw lines parallel to IL, to meet the line GI. From the points where these parallels meet GI, draw lines perpendicular to IL to meet IH; and parallels to IL, drawn from the points of intersection in IH, will meet the perpendiculars A*a*, D*d*, &c. in the points *a*, *d*, *b* &c. in the projection, corresponding to the points ADB, &c. in the circle.

Since the projection of a circle is an ellipse, (*Cor.* 8,) it will be sufficient to find the projection of the diameters, AC and BE; and on these diameters describe an ellipse by any of the methods given in Practical Geometry.

Problem 7.—To find the projection of a line perpendicular to a plane, of which the position is given.

Let IL be the intersecting line, (*fig.* 9, *plate* LXXX,) and A the point in the given plane, to which the line is perpendicular. Draw A*b* perpendicular to IL, and make *a*V*w* equal to the angle the given plane makes with the plane of projection; also make V*w* equal AV. Let BD, drawn perpendicular to V*w*, be the given line; and from B and D draw lines parallel to IL, cutting A*b* in the points *b* and *d*; then *bd* is the projection of the line BD.

Problem 8.—To determine the projection of a line, which is inclined in a given angle, to a plane, of which the position is given.

Let AB (*fig.* 10,) be the given line, and BAC its inclination to the primitive plane. Make BC perpendicular to AC, and AC is its projection on the primitive plane. Let *c*V*w* be the angle, which the primitive plane makes with the plane of projection, and find the projection of the line AC, by Problem 2. Make *wx* perpendicular to *w*V, and equal to BC; and from *x* draw a line parallel to IL, meeting the perpendicular C*b* in *b*. Join *ab*, and it is the projection of AB.

Problem 9.—To determine the projection of a triangular pyramid, (*fig.* 11.)

Let the pyramid stand upon a plane, which is inclined to the plane of projection, in the angle *o*V*w*, and let *xy* be its perpendicular height, and ABC the plan of its base. Project the plan of the base, by Problem 4, and draw D*d* perpendicular to IL. From *x* draw a line parallel to IL, cutting D*d* in *d*; then *d* is the projection of the vertex of the pyramid: and join *dc*, *da*, and *db*, and it completes the projection of the pyramid.

Problem 10.—To determine the projection of a rectangular prism, (*figs.* 3 and 4, *plate* LXXXI.)

Figure 3 supposes the primitive plane to coincide with the upper end of the prism; and *fig.* 4 supposes the primitive plane to coincide with the base of the prism; but the process is the same in both cases.

Let ABCD represent the end of the prism which is given, and find its projection, *abcd*, by Problem 4. Also, find the projection *by*, of the angle or arris of the prism, by Problem 7, XY being the height. From the point *y*, draw lines parallel to *bc* and *ba*, and complete the parallelogram *yxwv*, in *fig.* 3.

Problem 11.—To determine the projection of an oblique prism, (*fig.* 5.)

Let EGH be the inclination of the arris of the prism to its base, and BF the projection of that arris on the primitive plane. Find the projection of the base, ABCD, by Problem 4, and the projection of the arris by Problem 8, and complete the representation, as in the last Problem.

Problem 12.—To determine the projection of a right cylinder, (*fig.* 6.)

Find the projection of the base by Problem 6, and the projection of its altitude by Problem 7, as indicated by the figure.

SHADOWS.

THE Theory of Shadows is founded on the supposition that light is propagated in straight lines. This supposition is not strictly true; but it does not sensibly differ from the truth in any case where we have occasion to apply it in finding shadows.

As shadows from artificial lights are seldom introduced in architectural drawings, we propose to confine our rules to those produced by the sun; and the sun's rays may be considered parallel to one another in consequence of its immense distance, compared with the distances of any objects on the earth's surface.

DEFINITIONS.

1.—Those parts of a body which receive the direct rays of the sun are said to be in *light.*

2.—Those parts of a body which do not receive the direct rays of the sun are said to be in *shade.*

3.—That part of a surface which is deprived of light, by another body intercepting the sun's rays, is said to be in *shadow.*

The doctrine of shadows has two objects, *viz.*—to determine the boundary of light and shade, and to find the form of the shadow. In architectural drawings, the breadth of a shadow is usually made equal to the depth of the projection which produces it; and an adherence to this simple rule has several advantages, besides its convenience in application; for, when it is attended to, the real quantities of projection or recession are shown by a shadowed elevation, rendering it at once ornamental and useful.

But though the shadows are equal to the projections, and the drawing is said to be shadowed at an angle of 45°, the inclination of the sun's rays to the plane of the horizon is only 35° 16′;* and it is the projection of the direction of the sun's rays against the vertical plane which make an angle of 45° with the horizon.

EXAMPLES.

Ex. 1.—To find the shadow of a small rod projecting at right angles, from a vertical plane.

Let b (*fig.* 1, *plate* LXXXIII, *Shadows,*) be the point in the plane from which the rod projects, and a A its plan; ZX being the base line, or intersecting line of the plan and vertical plane.

From A, draw Ac in the direction of the sun's rays, (which is 45° in these Examples,) and raise the indefinite perpendicular $c d$. From b draw $b d$, in the projected direction of the sun's rays, (which is also 45° in these Examples,) intersecting $c d$ in d; then $b d$ will be the shadow of the rod.

Ex. 2.—To find the shadow of a vertical plane, situate at right angles to the vertical plane on which it forms the shadow.

Let AB, (*fig.* 2,) be the plan of the plane, and $a b$ its elevation. Draw Bc, Ad, in the direction of the sun's rays; and from c and d raise vertical lines. From b draw a line in the projected direction of the rays, cutting the vertical lines in e and f; and $c e f d$ will be the boundary of the shadow against the vertical plane.

Ex. 3.—To determine the shadow which a rectangular plane will form against a wall, when the plane is inclined to the wall.

Let AB, (*fig.* 3,) be the plan of the plane, and $a a h b$ its elevation. Draw Ac, Bd, parallel to the direction of the sun's rays, and raise vertical lines from c and d. From a and h draw lines parallel to the projected direction of the rays, cutting the vertical lines in e, f. Join $e f$, and $c e f d$ is the boundary of the shadow on the wall.

Ex. 4.—To find the shadow projected, by a square pillar, against a wall.

From A, B, and C, on the plan of the pillar, draw lines, parallel to the direction of the sun's rays, to the base line; and from the points thus found, in the base line, raise vertical lines. Draw lines parallel to the

* For the radius is to the tangent of the sun's inclination as $\sqrt{2} : 1$. Hence, the radius being made unity, the tangent is $\frac{1}{\sqrt{2}}$; and its logarithm 0·849485, which corresponds, nearly, to the tangent of 35° 16′.

projected direction of the sun's rays from the points *g, h*, in the elevation, meeting the vertical lines in *n, m*, and *s*. Join *n m* and *m s*, which determine the boundary of the shadow.

The shadow of a triangular prism, (*fig.* 5,) is found by the same process, as will be obvious from the lines on the figure.

Ex. 5.—To find the shadow, projected against a wall, by a square pillar, with a square abacus or cap, and also the shadow of the cap against the pillar, (*fig.* 6.)

Draw lines, parallel to the direction of the sun's rays, to the base line, from the points A, D, and C, in the plan of the cap · and from the points E, H, in the plan of the pillar, extending the lines which pass through the points H and E, till they meet the plan of the cap. From each of the points thus found in the base line, draw indefinite vertical lines. Draw a vertical line from the point L, and also from the one adjoining E, to meet the under edge of the cap.

From these points in the under edge of the cap, and from the angles *a, d, e, r*, draw lines parallel to the projected direction of the sun's rays, which will meet the verticals in the points *m, p, o*, &c. Join these points, and the boundary of the shadow against the wall will be obtained.

From the point where the projected direction of the rays, from the under edge of the cap, cuts the angle *e* of the pillar, draw a line parallel to the edge of the cap, then join the point where this parallel meets the angle, *f*, with the point where the ray, from the part of the under edge of the cap, corresponding to L on the plan, meets the angle *h*, and the boundary of the shadow of the cap will be determined.

Figure 7 shows the lines for projecting the shadow of a horizontal cross, resting upon a square pillar; and *fig.* 8 exhibits the shadows of an entablature, supported by four square pillars.

Ex. 6.—To determine the shadow which a cylindrical abacus, or cap, casts upon its column; and also the shadow projected against a wall by the column and cap, *fig.* 9.

Let a line, perpendicular to the direction of the sun's rays, be drawn through the centre of the column on the plan; then, if vertical lines be drawn from the points where this perpendicular cuts the outlines of the column and cap, such vertical lines will determine the boundaries of light and shade; and, on the light side of these boundaries, the form of the shadow will be determined by the under edge of the cap; and on the shade side by the upper edge of the cap.

To find the shadow of any point, E, of the edge of the cap against the column, draw EG parallel to the direction of the sun's rays, and draw a vertical line from E, to meet the under edge of the cap; and one from G, upon the surface of the column. (This line is omitted in the figure.) Then, from where the vertical from E meets the edge of the cap, draw a line parallel to the projected direction of the rays to meet the vertical from G, in the point *g*, and *g* will be the boundary of the shadow. In the same manner, several points in the boundary may be determined, and the line of shadow drawn through them.

Again, to find any point in the boundary of the shadow against the wall, as for example, the point C, draw C *d* parallel to the direction of the light; and from *d* draw an indefinite vertical line. Since C is on the shade side, the shadow will be cast by the upper edge of the cap; therefore, draw a vertical line from C, meeting the upper edge in *c*; and from *c* draw a line parallel to the projected direction of the rays of light, meeting the vertical from *d* in the point *e*; then *e* is in the boundary of the shadow, and any other points may be found in the same manner.

The shadow projected by a square cap upon an octagon pillar is shown by *fig.* 10; also the shadow formed on a wall by the pillar and its cap.

Figure 11 exhibits the shadow cast by a square abacus on a column, and the shadow they form on a wall. In both these figures the shadows are determined, as in the preceding examples.

Ex. 7.—*Figure* 1, *plate* LXXXII, represents the shadow projected against a wall by a balcony, with its cantalivers.

ABCD is the plan, and *a b* the elevation of the balcony, and IL the base line. From the points A, K, E, and F, draw lines parallel to the direction of the rays of light to intersect the base line, and raise indefinite perpendiculars from each of the points of intersection. Also, from the points *a, k, e, f, g*, and *h*, in the elevation, draw lines parallel to the projected direction of the rays of light, meeting the indefinite perpendiculars in

the points m, n, o, p. Draw ns and op parallel to the base line; and when the shadow qr of the other cantaliver is found, by the same method as the one which is described, the boundary of the shadow on the wall will be determined.

The shadow against the end of the cantaliver is found by drawing FG parallel to the rays of light; and the ray, from the corresponding point g, in the elevation, meets the arris, f, of the cantaliver, in the boundary of the shadow, which is parallel to the edge kh of the balcony.

Ex. 8.—*Fig.* 2 shows the shadows projected by a pedestal upon a flight of steps, both in plan and elevation. A is the elevation, and B the plan of the flight of steps. From the points C on the plan, and c in the elevation, draw lines parallel to the direction of the rays of light, intersecting the lines of the steps in f, e, d, and E, D. The vertical dotted lines from these points determine the boundary of shadow on the plan, and on the elevation, as will be evident from the figure.

Ex. 9.—*Figure* 3 represents the shadow projected by a pediment against a wall. IL is the base line, with the plan of the pediment below it, and the elevation above it. It will be obvious that the shadows of the arrises of the pediment, which meet in the point h, are bounded by lines parallel to those arrises meeting in n; but when the projection of the upper members of the cornice is such that the arris hs is in shadow, the shadow of the under edge of the fillet g must be found, which is mr in this example. The other parts of this example being similar to the preceding ones, it is unnecessary to repeat the construction.

Ex. 10.—To find the shadow of a rectangular niche, with a semi-circular head.

ABCD (*fig.* 5,) is a plan of the niche, and ad its elevation. Find the shadow m of the point e, the centre of the arch; and from m, as a centre, describe the arc op, with the same radius as the arch. The rest of the process is evident from the figure.

Ex. 11.—In a portion of a pilaster, to find the shadow of the flutes in plan and elevation.

From the centre O, (*fig.* 4,) draw OG perpendicular to the direction of the rays of light, then OG is the line of light and shade, and the vertical Gg gives the point g, from whence the shadow in the elevation commences; and the shadows of the points, a, d, e, f, may be found in this manner, taking the point e for example

Draw Ei and ek parallel to the direction of the rays; and from i draw the vertical ik, meeting ek in k; then k is the shadow of the point e.

The shadow of the arris ah, is a portion of an ellipse cm; for the section through AC, in the plane of the arris, is a circle, and its projection is an ellipse, of which ch is the conjugate, and AC the transverse diameter; and if the ellipse be described on its conjugate ch, the line hm, parallel to the direction of the light, will cut the ellipse in the point where the shadow quits it. If cn be drawn perpendicular to the direction of the rays, n is the termination of the shadow; and it may be shown that the shadow mn, of the arc hn, is also a portion of an ellipse; but a more general method is somewhat easier in practice, besides being applicable to any species of curve.

Let the shadow of any point, v, be required; q being the corresponding point on the plan. Draw qt parallel to the rays of light; and let tsr be a section through tq; which, in this example, is an arc of a circle, of which w is the centre. From r, draw rs, to make an angle of 35° 16′ with qt; then a perpendicular, from the point s to qt, gives the point x, through which the shadow passes on the plan; and if a line be drawn from v, parallel to the direction of the rays of light, the point where a vertical line from x meets that line, will be in the boundary of the shadow in the elevation.

Ex. 12.—*Figure* 6 represents the shadow thrown against the back of the circular niche by its arris.

ABC is the plan, and acb the elevation of the niche, and d the centre. Draw $d6$ perpendicular to the direction of the rays of light, then the point 6 is the termination of the shadow. From each of the points, A, 1, 2, and 3, on the plan, draw lines to the back of the niche, in a direction parallel to the rays of light; and perpendiculars, from the points where they meet the back, will meet the directions of the rays from the corresponding points, a, 1, 2, 3, in the elevation, in the boundary of the shadow. To find the shadow of any other point, as 5, let fo be drawn parallel to the direction of the light, and fr perpendicular to fo, passing through the centre D; and $5m$ parallel to fr. From the point f describe the arc om; and make mn inclined to of, in an angle of 35° 16′. Draw np parallel to fr, and the vertical, from the point p, will meet the direction of

the light, from the point 5 in the elevation, in the boundary of the shadow. Any other points in its boundary be found in the same manner.

The shadows on the sections of domes, groins, and the like, are easily found by the same methods.

Figure 7 shows the shadow on the section of a circular room, with a level ceiling.

Having shown the methods of finding the shadows produced by the direct rays of the sun, the management of shadows, cast by reflected light on the parts of bodies in shade, will easily be obtained. The light must be considered to proceed from the reflecting surface, and the depth of shadow should be in proportion to the quantity of light it reflects. The direction of the reflected light may be determined from the well-known optical principle, that whatever angle the sun's rays make with the reflecting plane, they will be reflected in an equal angle from the plane in the opposite direction. Hence the shadows, from reflected light, are usually the reverse of the shadows produced by the direct rays of the sun; that is, if the one be cast downward the other will be cast upward.

We shall close this part of our subject with recommending the student to study from nature. His knowledge of the geometrical description of shadows will aid him in his researches, and nature will offer him new examples to exercise his skill in geometry.

DECIMAL ARITHMETIC, &c.

DECIMAL FRACTIONS.

At what time, or by whose ingenuity, Decimal Arithmetic was first introduced, is a subject quite unknown; but the perfection which it has now attained is, doubtless, owing to modern times.

In Decimal Fractions, the integer or unit, (whether it be a unit of time, of weight, or of measure,) is supposed to be divided into ten equal parts; and each of those parts is again supposed to be sub-divided into ten equal parts, and so on to infinity, according to the powers of ten.

The integer thus divided is to be considered as the numerator of a fraction, while 10, and its successive powers, compose the denominator. Thus $\frac{7}{10}$, $\frac{7}{100}$, $\frac{7}{1000}$, $\frac{7}{10000}$, &c. to infinity.

But, in dividing by one with any number of cyphers annexed, it is usual to cut off from the dividend as many places towards the right as there are cyphers in the divisor; therefore, since the denominator of a decimal fraction is always one with some determinate number of cyphers annexed, it may be rejected in every case, and a point or period used in place of it: thus, $\frac{7}{10}$ may be denoted by ·7, and $\frac{7}{100}$ by ·07. Hence it appears, that cyphers placed to the left of a decimal fraction, decrease its value exactly in the same proportion that cyphers placed to the right of whole numbers increase their value; that is, in a proportion rising by the successive powers of 10.

The following Table will exhibit the relation between the integral and fractional scales

Whole Numbers.					*Decimal Fractions.*					
Tens of Thousands .	Thousands	Hundreds	Tens	Units place . . .	Parts of Ten, or $\frac{1}{10}$.	Parts of a Hundred . .	Parts of a Thousand .	Parts of Ten Thousand	Parts of 100 Thousand	Parts of a Million. . .
5	4	3	2	1 ·	1	2	3	4	5	6

From this it appears that Decimal Fractions are really more like whole numbers than Vulgar Fractions are; and the various processes to be performed on them are precisely the same, the place of the point, or period, that marks the fraction, being the only difference to be attended to.

ADDITION OF DECIMALS.

Rule.—Place the numbers under each other, according to the value of their places, Find their sum, as in whole numbers, and point off as many places for decimals as are equal to the greatest number of decimal places in any of the given numbers.

Examples.—1. Find the sum of 25·635+7·0625+32·125+·006325+·75+11·010325:

$$\begin{array}{r}
25{\cdot}635 \\
7{\cdot}0625 \\
32{\cdot}125 \\
{\cdot}006325 \\
{\cdot}75 \\
11{\cdot}010325 \\
\hline
76{\cdot}589150 \\
\hline\hline
\end{array}$$

Where the cypher on the right-hand side of the decimal may be omitted, as it does not alter the value of the fraction.

2.—Find the sum of 376·25+86·125+637·4725+6·5+358·865+41·02.—*Ans.* 1506·2325

3.—Find the sum of 3·5+47·25+927·01+2·0073+1·5.—*Ans.* 981·2673.

4 —Find the sum of 276+54·321+·65+112+1·25+·0463.—*Ans.* 444·2673.

SUBTRACTION OF DECIMALS.

Rule.—Subtract, as in whole numbers, and mark off the decimals, as in Addition.

Examples.—1. Find the difference between 2464·21 and 327·07643.

$$\begin{array}{r}
2464{\cdot}21 \\
327{\cdot}07643 \\
\hline
2137{\cdot}13357 \\
\hline\hline
\end{array}$$

2.—Find the difference between 127·62 and 13·725.—*Ans.* 113·895.

3.—Find the difference between 603·5725 and 32·0012.—*Ans.* 571·5713.

4.—Find the difference between ·65325 and ·0735.—*Ans.* ·57975.

MULTIPLICATION OF DECIMALS.

Rule.—Multiply as in whole numbers, and cut off as many decimal places from the product as are contained in both factors. If there be not so many places in the product as there are decimal places in both factors, the deficiency must be supplied by prefixing cyphers to the left-hand side of the product.

Examples.—1. Required the product of ·325 and 32·5.

$$\begin{array}{r}
32{\cdot}5 \\
325 \\
\hline
1625 \\
650 \\
975 \\
\hline
10{\cdot}5625 \\
\hline\hline
\end{array}$$

2.—Multiply ·0375 by 33·75.—*Ans.* 1·265625.

3.—Multiply ·63478 by ·8204.—*Ans.* ·520773512.

4.—Multiply ·385746 by ·00464.—*Ans.* 00178986144.

DIVISION OF DECIMALS.

Rule.—Divide as in whole numbers; and from the right-hand side of the quotient point off as many places for decimals, as the decimal places in the dividend exceed those of the divisor. If there are not so many places in the quotient, the deficiency must be supplied by prefixing cyphers to the left of the quotient If there be a remainder, cyphers may be annexed to the dividend, and the division continued.

Examples.—1. Divide 395·275 by 3·75.

```
3·75)395·275 (105·406
     375
     ----
      2027
      1875
      ----
       1525
       1500
       ----
        2500
        2250
        ----
         250
        ====
```

Here the number 250 would recur at every step: hence the quotient figure would always be the same, and this kind of decimal is said to repeat. Whence the appellation of repeaters.

2.—Divide 234·70525 by 64·25.—*Ans.* 3·653.

3.—Divide 217·568 by 1000.—*Ans.* ·217568.

4.—Divide ·408408 by 52.—*Ans.* ·007854.

REDUCTION OF DECIMALS.

Case 1.—To reduce a vulgar fraction to a decimal of equal value.

Rule.—Multiply the numerator by 10, or its power, and divide by the denominator.

Examples.—1. Reduce $\frac{1}{2}$ to a decimal fraction.

```
2) 1·0
   ---
    ·5
```

2.—Reduce $\frac{1}{4}$ to a decimal fraction.

```
4) 1.00
   ----
    ·25
```

3.—Reduce $\frac{1}{5}$ to a decimal fraction.

```
5) 1·0
   ---
    ·2
```

4.—Reduce $\frac{1}{8}$ to a decimal fraction.

```
8) 1·000
   -----
    ·125
```

Note.—What number of cyphers more than one we have to annex before the division succeeds, so many cyphers must be placed on the left side of the first significant figure in the quotient.

Examples.—1. Reduce $\frac{1}{16}$ to a decimal fraction.

```
16) 1·00 (.0625
     96
    ----
     40
     32
    ----
      80
      80
     ====
```

2.—Reduce $\frac{1}{200}$ to a decimal

```
200) 1·000 (·005
     1·000
     =====
```

Sometimes, in dividing, the same remainder successively arises, consequently the same figure must be successively obtained in the quotient; when this is the case, the decimal is called a repeater; when the repeater is not preceded by some figures that do not repeat, the decimal is called a pure repeater; but if one or more figures precede the common figure, it is a mixt repeater.

EXAMPLES.—1. Reduce $\frac{1}{3}$ to a decimal fraction.

$$3)\ 10$$
$$\cdot 333, \&c. \text{ a pure repeater.}$$

2.—Reduce $\frac{1}{6}$ to a decimal fraction.

$$6)\ 1$$
$$\cdot 166, \&c. \text{ a mixt repeater.}$$

It sometimes also happens, that a certain number of figures recur, in this case the decimal is called a circulating one.

EXAMPLES.—1. Reduce $\frac{1}{7}$ to a decimal fraction.

$$7)\ 1\cdot 000000$$
$$\cdot 1428571, \&c. \text{ a circulating decimal.}$$

2.—Reduce $\frac{1}{11}$ to a decimal fraction.

$$11)\ 100\ (\cdot 0909, \&c. \text{ a circulate.}$$

EXAMPLES.—1. What is the decimal value of $\frac{3}{8}$?—*Ans.* ·375.

2.—What is the decimal value of $\frac{1}{25}$?—*Ans.* ·04.

3.—Reduce $\frac{3}{192}$ to a decimal.—*Ans.* ·015625.

4.—Find the decimal value of $\frac{275}{3842}$.—*Ans.* ·071577, &c.

CASE 2.—To reduce numbers of one denomination to decimals of another denomination retaining the same value.

RULE.—Reduce the integer to the same name with the given number, and divide the lesser by the greater, annexing cyphers to the dividend for the decimal.

EXAMPLES.—1. Reduce 9 shillings to the decimal of a pound.

$$\begin{array}{r} 1 \\ 20 \\ \hline 20 \text{ shillings.} \end{array}$$
$$\frac{9}{20} = \cdot 45 \text{ of a pound.}$$

2.—Reduce 2 feet 6 inches to the decimal of a yard.

$$2 \text{ ft. } 6 \text{ in.} = 30 \text{ inches.}$$
$$3 \times 12 = 36 \text{ inches.}$$
$$\frac{30}{36} = \frac{5}{6} = \cdot 83\dot{3}, \&c.$$

3.—Reduce 6 inches to the decimal of a foot. *Ans.* ·5.

4.—Reduce 9*d.* to the fraction of a shilling.—*Ans.* ·75.

CASE 3.—To value any given decimal in terms of the integer.

RULE.—Multiply the decimal by the number of parts in the next less denomination, and cut off as many places for the right hand as there are places in the given decimal for a remainder.

Multiply this remainder by the number of parts in the next inferior denomination, and cut off the same number of places as before, and so on.

EXAMPLES.—1. What is the value of ·625 of a shilling?

$$\begin{array}{r} \cdot 625 \\ 12 \\ \hline 7\cdot 500 \\ 4 \\ \hline 2\cdot 000 \\ \hline\hline \end{array}$$

Hence, $7\frac{1}{2}d.$ is the equivalent of ·625 of a shilling.

2. What is the value of ·75 feet?—*Ans.* 9 inches.

3.—What is the value of ·125 feet?—*Ans.* 1½ incn.

4.—What is the value of ·0375 £?—*Ans.* 9*d.*

5.—What is the value of $\cdot 33\dot{3}$ feet?—*Ans.* 4 inches.

Note.—In those cases where repeaters occur, the steps are precisely the same as in finite decimals, only observing to carry for each 9 when operating on the first repeating figure.

DUODECIMAL ARITHMETIC.

As dimensions are generally taken in feet and inches, which are divided and subdivided by 12, and its powers, a peculiar kind of Arithmetic, adapted to subdivision by 12, is used by Artificers in computing the contents of their work; it is called Duodecimals, or Cross Multiplication.

To Multiply Feet, Inches, &c. by Feet, Inches, &c.

Rule.—Under the multiplicand, write the corresponding denominations of the multiplier.

Multiply each term in the multiplicand, beginning at the lowest, by the feet in the multiplier, and write the result of each under its respective term, observing to carry an unit for every 12 from each denomination to that next superior.

In the same manner, multiply all the multiplicand by the inches in the multiplier, and set the respective results one place removed to the right of those in the multiplicand.

Do the same with the seconds, and other lower denominations, and the sum of all the partial products will be the answer.

Examples.—1. Multiply 6 ft. 3 in. 9 sec. by 6 ft. 9 in. and 3 sec.

ft.	*in.*	*sec.*		
6	3	9		
6	9	3		
37	10	6		
4	8	9	9	
	1	6	11	3
42	8	10	8	3

2.—A garden wall is 254 feet long, 12 feet 7 inches high, and three bricks thick: how many rods are in it? —*Ans.* 23 rods and 136 feet.

3.—A room is to be ceiled, whose length is 74 feet 9 inches, and width 11 feet 6 inches: what will it come to at 3*s.* 10½*d.* per yard?—*Ans.* £18. 10*s.* 1*d.*

4.—If a house measures, within the walls, 52 feet 8 inches in length, and 30 feet 6 inches in breadth and the roof of true pitch, or the rafters three-fourths of the breadth of the house; what will it cost roofing, at 10*s.* 6*d.* per square?—*Ans.* £12. 12*s.* 11¾*d.*

INVOLUTION, OR THE RAISING OF POWERS.

A power is the product that arises by multiplying a number by itself as many times (wanting one) as there are units in the exponent of the power proposed.

Examples.—1 What is the fifth power of 7?

7
7
49 = second power.
7
343 = third power.
7
2401 = fourth power.
7
16807 = fifth power.

2.—What is the third power of 35 ?—*Ans.* 42875.

3.—What is the fifth power of ·015 ?—*Ans.* ·000000000759375.

4.—What is the fourth power of 3·7 ?—*Ans.* 187·4161.

The first nine powers of the nine digits being arranged in a Table, are frequently found to be of considerable use in facilitating the computation of powers.

Table of the first Nine Powers of Numbers.

1st.	2d.	3d.	4th.	5th.	6th.	7th.	8th.	9th.
1	1	1	1	1	1	1	1	1
2	4	8	16	32	64	128	256	512
3	9	27	81	243	729	2187	6561	19683
4	16	64	256	1024	4096	16384	65536	262144
5	25	125	625	3125	15625	78125	390625	1953125
6	36	216	1296	7776	46656	279936	1679616	10077696
7	49	343	2401	16807	117649	823543	5764801	40353607
8	64	512	4096	32768	262144	2097152	16777216	134217728
9	81	729	6561	59049	531441	4782969	43046721	387420489

EVOLUTION, OR THE EXTRACTION OF ROOTS.

The root of any number or power, is such a number, as being multiplied into itself a certain number of times, will produce the power proposed.

Thus, 3 is the square root of 9, because $3 \times 3 = 9$; and 8 is the cube root of 512, because $8 \times 8 \times 8 = 512$.

The exact root of every number cannot be determined; but, by means of decimals, we may approximate to any degree of exactness required.

The roots thus approximated are called *Surd Roots*; and those which can be exactly found, are called *Rational Roots.*

To Extract the Square Root.

Rule.—Divide the given number into periods of two figures each, pointing towards the left in integers, but towards the right in decimals.

Find the greatest square that is contained in the first period on the left hand; (setting down its root like a quotient figure in division;) subtract that square from said period, and to the remainder bring down another period for a new resolvend.

Double the root of the first square for a divisor. Find how often this divisor can be got in the dividend, omitting the first figure on the right, and set the result in the quotient, and also annex it to the divisor.

Subtract the product of this quotient figure, and the divisor so augmented from the dividend, and to the remainder bring down the next period for a new dividend.

Find a divisor, as before, by doubling the figures that are already in the root; and from these find the next figure of the root, as in the last step; and so on till all the periods be brought down.

If there be still a remainder, the root may be approximated by annexing periods of cyphers for decimals

Note.—The reason for dividing the number into periods of two figures each, is, because the square of any single digit never amounts to more than two places. Hence there must be as many figures in the root, as there are periods of two figures in the given number.

EXAMPLES.—1. What is the square root of 1225 ?

```
 3) 1225 (35
    9
65) 325
    325
    ...
```

2.—What is the square root of 723 ?

```
       2) 723 (26·888659
          4
      46) 323
          276
     528) 4700
          4224
    5368) 47600
          42944
   53768) 465600
          430144
  537766) 3545600
          3226596
 5377725) 31800400
          26888625
53777309) 491177500
          483995781
          ··7181719
```

3.—Required the square root of ·0729.

```
 2 ) ·0729 (·27
      4
47)   329
      329
```

4.—Extract the square root of ·00032754.—*Ans.* ·01809.

5.—Extract the square root of 368863.—*Ans.* 607·340092, &c.

To Extract the Square Root of a Vulgar Fraction.

RULE.—Extract the root of the numerator for the numerator of the root sought, and the root of the denominator for the denominator. Or reduce it to a decimal and proceed as before.

EXAMPLES.—1. Required the square root of $\frac{729}{1225}$.

The square root of 729 is 27, and the root of 1225 is 35, consequently, the square root of the proposed fraction is $\frac{27}{35}$.

2. Reouired the square root of $\frac{16}{29}$.

```
29) 160 (·5517241379, &c.
    145
    150
    145
      5
```

```
       7) ·5517241379 (·74278
           49
      144) 617
            576
     1482) 4124
            2964
    14847) 116013
            103929
   148548) · 1208479
              1188384
               ··20095
```

3. What is the square root of $\frac{64}{81}$?—*Ans.* $\frac{8}{9}$.
4. What is the square root of $\frac{72}{98} = \frac{6}{7}$.

To extract the Cube Root.

Rule.—Separate the given number into periods of three figures each, putting a point over every third figure from the place of units.

Find the greatest cube in the first period, and set its root on the right hand of the given number, after the manner of a quotient figure in division.

Subtract the cube thus found from the said period, and to the remainder annex the next period, and call this the resolvend.

Under the resolvend put the triple root and its triple square, the latter being removed one place to the left, and call their sum the divisor.

Seek how often the divisor may be had in the dividend, exclusive of the place of units, and set the result in the quotient.

Under the divisor put the cube of the last quotient figure, the square of it multiplied by the triple root, and the triple of it by the square of the root, each removed one place to the left, and call their sum the subtrahend.

Subtract the subtrahend from the resolvend, and to the remainder bring down the next period for a new resolvend, with which proceed as before, and so on till the whole be finished.

Note.—Should there be a remainder after all the periods are brought down, the operation may be continued by annexing periods of cyphers, as in the square root.

Examples.—1. What is the cube root of 1953125?

```
              3           1953125 (125 root.
             3            1
      Divisor 33          953       resolvend.
                           8
                          12
                          6
  12 ×3=   36             728       subtrahend.
  12²×3=432               225125    resolvend.
  Divisor 4356              125=5³
                           900 =5² ×12×3
                          2160 =12²× 3×5
                          225125    subtrahend.
```

2.—What is the cube root of 146708·483 ?—*Ans.* 52·74.

3.—What is the cube root of ·0001357 ?—*Ans.* ·05138.

4.—What is the cube root of $13\frac{2}{3}$?—*Ans.* 2·3908.

5.—What is the cube root of 27054036008 ?—*Ans.* 3002.

We shall now give a few examples to exercise the reader in the application of the square and cube roots.

Given the hypothenuse and one leg of a right-angled triangle to find the other leg.

Rule.—Multiply the hypothenuse and leg each by itself, and the square root of the difference will be the length of the other leg.

Or thus, multiply the sum of the hypothenuse and leg by the difference of the same, and the square root of the product will be the other leg.

Example.—The length of the rafters is 18 feet, and half the width of the house 12 feet, What is the perpendicular rise of the roof?

18 × 18 = 324
12 × 12 = 144
180 (13·038 feet.
1
23) 80
79
2603) 10000
7809
26068) 219100
208544
10556

Or thus,

18 + 12 = 30
18 − 12 = 6
180 the root of which is 13·038 feet.

Given the two legs to find the hypothenuse.

Rule.—Multiply the two legs each by itself, and the square root of the sum will be the hypothenuse.

Example.—The perpendicular height of a roof is 13·038 feet, and the width of the house 24 feet; required the rafter.

$\frac{24}{2}$ = 12
12 × 12 = 144
13·038 × 13·038 = 180
1) 324 (18 feet, the rafter sought.
1
28) 224
224

1.—The diameter of a globular stone is 12 inches What must be the diameter of another that contains 6 times the matter ?—*Ans.* 21·7, &c. inches.

Rule.—Cube the diameter and multiply by 6, and the cube root of the product is the answer.

DESCRIPTION AND ARRANGEMENT OF THE PLATES.

The first twenty-eight plates being described in the former part of this work, (vide the Contents,) we now proceed to describe the remaining plates.

Plate XXIX.—*Figure* 1 represents a Design for the Front Elevation of a first-rate House, the dimensions of this and the three following plates being proportioned according to the rules enforced by the London Building Act.

Figure 2 represents a vertical section of *Figure* 1.

Figure 3 shews a Plan of the Basement Story. C, Area. D, front Kitchen. H, Passage. F, Cupboard. E, Wine Cellar. I, Stairs. N, Passage to O, the back Kitchen. L, Water-Closet. R, Servants' Hall. S, Butler's Pantry. T, Store Room. V, Area.

Figure 4.—Plan of Ground Floor. C, Vestibule. D, Dining Room. E, Stairs. F, Library. G, Passage Room to Water Closet, H, and Bath Room, I. L, Lead Flat over Servants' Hall. N, Area. O, three-stall Stable, with Bed-rooms over. P, the Coach-House. *Figure* 5 shews a front elevation of the coach-house.

Plate XXX.—*Figure* 1. Front Elevation of a second-rate House. *Figure* 2, section of the same on the line A B, of *Figure* 3, which represents a plan of the ground floor. C, the Area. E, Vestibule. F, Dining Room. G, Library. H, Staircase. I, Passage Room to Bath Room, P, and Water Closet, O. R, Lead-flat over back area, forming wash-house. *Figure* 4, Section of the Floors.

Plate XXXI.—*Figure* 1 shews a front Elevation of a third-rate House. *Figure* 2, a section through the same on the line A B, seen in *Figure* 3, shewing, by dotted lines, the directions of the chimneys, or flues. In *Figure* 3, C is the Entrance. D, the Passage. E, Dining Room. F, Study. H, Door-way to back yard. I, Water-Closet. L, Store-Room.

Plate XXXII.—*Figure* 1 is an Elevation of a fourth-rate House. *Figure* 2, a Plan of the Basement Floor. A, front Kitchen. B, Wash-house. C, Stairs. D, back Area. E, front Area. H, Cellar, under foot-way. *Figure* 3, Plan of the Ground Floor. A, Dining Room. B, back Parlour. C, Stairs. D, Water-Closet. E, Entrance to Yard. F, Stairs to back Area.

For further particulars concerning the law and regulations for building the various rates of houses in the metropolis, we beg leave to refer our readers to Kelly's edition of the Builders' Price Book, containing the Building Act, &c. printed uniform to bind up with this volume.

Plate XXXIII. is the Plan and Elevation of a Small Country Villa. *Figure* 1, Elevation of the villa, with a pediment in front, and another in the back. The construction of the roof, from its great projection of cornice, and the beautiful shadows which are thrown from the cantalivers has always a pleasing effect. In the centre is a porch, with four columns, of the Ionic order, coupled, on each side of the entrance, with a regular entablature and pediment. The windows of the chamber-floor are of the same height and width as the lower ones, with an architrave round them, on the top of which is a frieze and cornice.

Figure 2 is the Ground Plan of the above. A, the porch; B, stair-case; the other apartments are described on the figure.

Plate XXXIV.—Plans and Elevations for a Villa, with wings.—*Figure* 1. Principal Elevation: this building, if properly situated, would command a fine prospect from the circular bows in the wings. The whole extent of the building, including the wings, may be 85 feet 6 inches; each of the wings 24 feet 9 inches, and the body of the building 36 feet. The entrance is 3 feet 9 inches, raised upon three steps, of 6 inches rise, on the top of which are two Doric columns, with pilasters behind them. The columns are six diameters high; the entablature 2 feet 4 inches, and the blocking course 1 foot. The windows on each side of the porch, in the centre part of the building, are 4 feet 3 inches from the ground, 7 feet 6 inches high, and

3 feet 8 inches wide, with a Grecian architrave around them; diminishing on each side of the centre of the window, and parallel to the sides of the column.

Figure 2.—Ground Plan of the Principal Story. The Dining-Room, Library, Parlour, Drawing-Room, and Kitchen, are shewn by writing. A, the Vestibule; BB, the Passage; C, the Closet; D, the Scullery; E, the Pantry; *e, d,* Stairs to Chambers; *f,* Entrance to Wine-cellars, &c.

Figure 3.—Plan of the Chamber Floor. AA, Passage to Bed-rooms, shewn at B, C, E, G; D is a Dressing-room; F is for the same purpose; H, Water-closet. The stairs are shewn near A.

PLATE XXXV.—*Figure* 1. Plan and Elevation of a Castellated Gothic Villa, with buttresses, &c. This building would be suitable for a gentleman of moderate fortune. Its whole length is 78 feet; and its height, from the surface of the ground to the top of the battlements, 34 feet 2 inches. The battlements are continued all round the building. The buttresses are 29 feet 3 inches high, with two water tables, on the top of which is a cornice. The cornice is continued all round the building. The windows on the ground-floor are 4 feet 3 inches from the ground. The top of each window is crowned with a tablet, which reaches to a little below the top of the window, on each side. The chamber-floor windows are 19 feet from the ground, they are also crowned with a tablet, as below. The entrance is on the flank to the right, raised 1 foot 6 inches above the level of the ground, and ascended by three steps; it is enclosed within a porch; the openings of the front and sides of the porch are 8 feet and 4 feet 10 inches. On the left flank is a green-house, which will have a very beautiful effect on entering, as seen at one extremity of the passage through a sash-door.

Figure 2.—Ground Plan of the Principal Story. A, Porch; B, Passage, communicating to the different apartments; C, Stone Staircase to the Bed-chambers, Breakfast-Room, Dining-Room, Drawing-Room, and Library, which are marked on the plan; E, Parlour; D, Waiting-Room, or Dressing-Room; F, Water-Closet, which is entered by a door under the staircase. The Green-house is also marked on the plan. The Servants' apartments, &c. are on the basement, which is entered by the staircase, C.

PLATE XXXVI.—*Figure* 1. Plan and Elevation of a Castellated Gothic Villa, with Bruttresses and Pinnacles on a straight Front. The extent of this building, from the extremity of one wing to that of the other, is 60 feet; extent of each of the wings, 11 feet 10 inches. The body of the building, 36 feet 4 inches. The entrance, 3 feet 4 inches wide, with a Gothic head, receding from the central part of the front, forming a Porch, and raised above the level of the ground, and ascended by three steps. The entrance to the porch is 4 feet 10 inches wide, and it rises 6 feet to the springing of the arch: the arch is 4 feet high, and is ornamented with mouldings and crockets on each side. The windows of the ground floor, on each side of the Porch, are 6 feet 6 inches high by 4 feet 6 inches wide; and those in the wings are 6 feet high, and 4 feet 6 inches wide: those in the bed-chamber 4 feet 3 inches high, and 4 feet wide.

Figure 2.—Ground Plan of the Principal Story. A flight of three steps to the Porch, L; I, Hall; N, Staircase, of wood; PP, Passage to the different apartments; B, Breakfast-Room; A, Dining-Room, with folding-doors, opening into F, by which means the two may be united, forming thereby a great convenience upon many occasions. D, Parlour; C, Library; H, Servants Waiting-Room; E, Kitchen; G, Wash-house, O, Water-Closet.

PLATE XXXVII.—LODGES and ENTRANCE to a MANSION.—These lodges are in the castellated style, and would be suitable for the octagonal mansion represented in *plate* XXXIX.

Figure 1.—The Elevation of the Lodges. The central part, betwixt the piers, for carriages, may be 11 feet 9 inches in the clear, above the plinth. The height of the gateway 7 feet; the piers 3 feet wide and 9 feet 10 inches high: the faces and sides forming the internal angles (see *plan, fig.* 2,) are ornamented with small recesses, terminating at the top with Gothic heads, filled in with three cusps and two semi-cusps, denominated by the name of a Quatrefoil arch. The part above that is carried solidly over the internal angles, forming a regular octagonal figure, with two water-table mouldings, and small panels in the faces betwixt the mouldings, filled in with cusps.

The side-gate for passengers is 5 feet wide above the plinth, betwixt the porch and pier. The elevations of the fronts of the lodges is of an octagonal form, with hexagonal buttresses on the angles, the sides of which are filled in with small recesses, with Gothic heads. The battlements, including the corbels, are 2 feet high:

the windows are 3 feet wide and 6 feet high, from the sill to the top of the arch; standing in recesses 2 inches deep, 4 feet wide, and 8 feet high, from the top of the plinth to the top of the arch.

Figure 2.—Plan of the Lodges and Gateways. The whole length in front, from the extremity of one lodge to that of the other, is 67 feet 9 inches: the distance betwixt the porches is 27 feet 9 inches: the size of the porch, in the clear, is 5 feet 3 inches by 3 feet. The Living-Rooms, 14 feet by 11 feet 7 inches. The Bed-Rooms 11 feet 7 inches, by 7 feet 6 inches.

Plate XXXVIII.—Ground Plan of a Design for a Mansion in the Castellated Style.—The entrance is by a Groined porch, ascended by four steps, to be made of granite. I, Hall; L, Passage, lighted by a borrowed light from the lantern of the Picture Gallery; H, Principal Staircase; K, Back Staircase; E, Breakfast-Room; F, Music-Room; D, Dining-Room; G, Parlour; B, Drawing-Room; C, Library; A, Picture-Gallery, lighted by a lantern from the top of the building. The Water-Closet lighted by a borrowed light through ground-glass, from the well-hole of the staircase.

The plans of the rooms above are adapted to contain, at least, seven Bed-Rooms, with Dressing-Rooms and Closets.

Plate XXXIX.—Principal Elevation for a Mansion in the Castellated Style.—The whole length in front may be assumed as 131 feet 6 inches, exclusive of the buttresses. The body of the building, parallel to the front, and at right angles, passing through the centre of it, will thus be 102 feet 6 inches. Its whole height, from the ground to the top of the battlements, 88 feet. The height to the top of the second row of battlements of the larger octagonal body, 79 feet 8 inches. The turrets, 15 feet 6 inches high, 5 feet 3 inches diameter, and projecting three-quarters of a circle below the corbels, from the angles of the plain faces of the octagonal body. The windows in the faces, from the top downwards, are all of one width; each of their heights is, respectively, 5 feet, 6 feet, 7 feet, and 8 feet, high; with water-tables and mouldings over them. The window-frames, of oak, consist of a Munnion Transom and bars; the rectangular projections are 30 feet each in front, and 19 feet deep, with turrets at the angles 13 feet 6 inches high, and 5 feet diameter. The openings of the porch, in the clear, each 7 feet wide, and 17 feet high; ornamented on the chamfers with mouldings. On the top of the arch are crockets, rising in the form of pinnacles. The doors that light the Hall, which is seen through the openings of the porch, are each 5 feet 7 inches wide in the clear, and 16 feet high, moulded all round. The frames of the apertures are of oak, and are made to open in two halves; the bottom of which is panelled. The front of the octagonal wings extends 50 feet 3 inches; each of the faces is 20 feet 9 inches nearly, with buttresses on the angles. Their height, from the ground to the top of the enriched battlement, is 27 feet. The windows are each 7 feet 4 inches wide in the clear; their height, from the cill to the top of the arch, is 14 feet. The reveals are chamfered about half-way in. The space between the cill and the plinth is filled in with ornamented panels. The frames of the windows are of oak, with Gothic heads, and are made to open in one of the compartments.

Plate XL.—Ground Plan of the Seat of Henry Monteith, Esq. at Carstairs, near the River Clyde. The space H represents the porch, with buttresses at the corners, ascended by three steps, and groined in the inside. E, Hall, with two small windows, on each side of the doorway; D, Library, of an octagonal form, having a beautiful bay-window. Length of the Passage, 10 feet 3 inches. I, Grand Staircase, lighted by a large window in the side wall, and opposite to the window in the bottom of the passage; C, Breakfast-Room; B, Dining-Room; A, Drawing-Room; F, Bed-Room; V, Powdering-Room; N, Parlour; L, Nursery; G, Kitchen, below the level of the Rooms on the ground-floor, and communicating to them by a winding staircase at one corner; O, Bed-Room; P, Bed-Room; R, Housekeeper's Room; U, Anti-Room, lighted at the top, with a closet at one end.

The largest winding staircase leads up to the servants' Bed-Rooms, which are carried lower than the Bed-Rooms over the body of the building, and communicate with the Bed-Rooms on the body of building by a door, leading off from the second flight of steps of the grand staircase. The parts which are broken off at the farthest extremity to the left, are the offices connected with the Kitchen.

Plate XLI.—Principal Elevation of the Seat of Henry Monteith, Esq.—The whole extent of this building, exclusive of the offices, not shown in the plate, is 175 feet. The principal part, including the

bays, with the Oriel windows on each side of the porch, is 64 feet 10 inches. The entrance, within the porch, is 5 feet 9 inches wide in the clear, and 12 feet 10 inches high to the top of the soffit of the arch, raised 1 foot 7½ inches above the level of the ground, and ascended by three steps of 6½ inches rise, tread 1 foot. The width of the opening in the porch is 11 feet 6 inches, and its height 13 feet 6 inches, from the top of the steps to the top of the soffit of the arch.

The height of the porch, from the ground to the top of the battlements, is 20 feet 9 inches. The height of the central part, behind the porch, from the ground to the top of the battlements, is 54 feet 6 inches; its breadth, (including the octagonal buttresses, which rise at the top into pinnacles,) is 24 feet. The height of the bay, with the Oriel window, between the octagonal buttresses, from the ground to the top of the battlements, is 37 feet; its breadth 12 feet 6 inches. The central Oriel window, without the munnions, is 5 feet wide, and 9 feet 6 inches high: each of the diagonal openings is 2 feet 6 inches wide, in the clear of the reveals.

The window above the bay is 5 feet 8 inches wide, and 6 feet 2 inches high, divided into munnions with Gothic heads. The bays, with the Oriel windows on each side of the porch, are 35 feet 6 inches high, from the ground to the top of the battlements, and 16 feet wide. Each of the Oriel windows, in the central part, on the ground-floor, is 7 feet 4 inches wide, and 12 feet high in the clear; and each of the diagonal openings 2 feet 4 inches in the clear. The Oriel windows over the ground-floor, in the central part, are each 7 feet 6 inches wide, and 9 feet high, and those on the diagonals 2 feet 4 inches wide. The part behind the bays is of a pediment-form, with square buttresses, and small pediments, rising into pinnacles.

The extreme wing, to the left, is 29 feet wide, and 39 feet high, from the ground to the top of the battlements. The turrets are each 11 feet 9 inches high, and project three-quarters of a circle out, from the angles below. The window on the ground-floor is 7 feet wide, and 9 feet 3 inches high. The Oriel window above, in the central opening, is 4 feet 9 inches wide and 7 feet high: the side openings are each 1 foot 7 inches wide. The space which recedes from the wing to the left, and to the octagonal tower, is 24 feet 5 inches wide, and 31 feet high to the top of the battlements.

The windows on the ground-floor are each 3 feet 9 inches wide, and 8 feet 5 inches high: the windows above are 3 feet 9 inches wide, and 5 feet 10 inches high. The octagonal tower, adjacent to the above, is 11 feet wide and 45 feet high; each of the small windows in the faces, from the top downwards, is 7 feet, 8 feet, and 8 feet 7 inches high: their width, in the clear, 1 foot.

The space between the Oriel windows and the octagonal tower is 29 feet wide, and 36 feet 6 inches high, from the ground to the top of the battlements; the windows on the ground-floor are 4 feet 10 inches wide, and 10 feet high; the windows above those on the ground-floor are 3 feet 9 inches wide, and 6 feet 6 inches high.

The octagonal tower at the extremity, to the right, is 11 feet wide, and 49 feet high from the ground to the top of the battlements; each of the windows, from the top downwards, is 6 feet 9 inches, 7 feet 9 inches, and 9 feet 9 inches high; and each of their widths 13 inches. The small space between the tower and the Oriel windows is 5 feet 9 inches: the small windows between are blank. All the munnions and Gothic heads which divide the windows into compartments are of oak.

Plate XLII.—Plan *and* Elevation *of a* Mansion.—*Figure* 1. This building, though perfectly straight in front, would have a pleasing effect from its colonnade, and the portico projecting out from it. The whole length of the building may be 89 feet 6 inches, and its height, from the ground to the top of the blocking-course, 49 feet. The columns are of the Doric order, without flutes, raised upon a plinth 18 inches above the level of the ground, and stand 4 feet from the wall. The height of the columns is 14 feet; being six diameters and a half high. The entablature, 2 feet 10 inches; above which is a blocking-course, about 10 inches high, on which the balcony is fixed.

The windows under the colonnade are 8 feet 9 inches high, and 4 feet 5 inches wide, and come down within 5½ inches of the level of the colonnade, forming a step out. The architraves around the windows are one-sixth of their opening. The sashes are of the common kind; but are so constructed as to make them go higher up than the top of the window, in order that a person may get out without stooping.

The entrance is 4 feet 6 inches wide, with a small window on each side, and a fan-light over the top to lighten the vestibule. The two columns which stand before pilasters, and immediately behind the two extreme columns, in front of the portico, are intended to rest a beam upon the top of them, in order to support a verandah, which comes a little before the balcony, and is composed of piers of 1 foot 2 inches square, and 9 feet 6 inches high; which may be either of stone or wood, with bases and ornamented caps. On the top of this is an entablature, 2 feet high, with a small blocking-course. The windows on each side of the verandah are 9 feet high, and 4 feet 3 inches broad, with an architrave one-sixth of the width round them, and a frieze and cornice above, and come down to 6 inches from the level of the balcony, forming a step out.

The sashes are of the same form as those below. Those in the attic are of smaller dimensions; their height 6 feet 3 inches by 4 feet. That in the centre is a Venetian window, with a flat segment-head. Above the attic is a cornice, 1 foot 3 inches high, and 2 feet projection; its parts are a fillet, ovolo, and corona, with a channel underneath to carry off the rain. There is also a semi-reversa next to the wall, which is concealed in the channel, the bottom of which is on a level with the bottom of the corona, and cannot be seen unless in perspective. There is also a bead and fascia below that.

Figure 2.—*Ground Plan* or *Principal Story.* A, *Porch.* BB, *Colonnade.* C, *Hall.* G, *Stone-Staircase,* with flyers and winders. N, *Back-Staircase.* The *Dining Room,* 32 feet 6 inches by 19 feet 6 inches. *Library* and *Breakfast-Room* of the same dimensions. *Housekeeper's Room,* 15 feet square. *Steward's Room,* 15 feet by 13 feet. *Strong-Room,* 7 feet 3 inches by 6 feet 3 inches. *Dressing-Room,* 15 feet by 12 feet 9 inches. *Store-Room,* 15 feet by 9 feet 10 inches.

PLATE XLIII.—GROUND PLAN *of a* CHURCH *in the* GRECIAN STYLE. The PORTICO (*a*), of four columns, projects out from the front of the wall, 8 feet 6 inches. The *Vestibule* (*b*) leads to the body of the chapel and side stair-cases. *Staircases* of an elliptical form (*cc*), leading to the gallery, 22 feet 8 inches by 20 feet 9 inches; length of treads, 4 feet 10 inches; breadth, in the middle, 11 inches; risers rather more than 6 inches. *Side Entrances, ff.*

The body of the church may be 89 feet long and 54 feet 3 inches broad, and it will contain sixteeen hundred sittings, (including free seats,) exclusive of seats for children in front of the organ.

hhhh, represent *Pews,* 3 feet wide; seats, 1 foot; book-desk, 5½ inches; *oo, Larger Pews; pp,* spaces between the free seats. The *Pulpit* (*n*), of an hexagonal form; *i, Stair,* ascending to it. *Reading-Desk* (*m*), with clerk's seat in front; stair, (*i*) ascending to it. The *Communion-place,* of a circular form, with four three-quarter columns, and two antæ: betwixt the columns are two niches, and a window in the centre.

s, is the *Vestry-Room; y,* the Entrance to Circular Stair leading to library above; *u,* the *Anti-Room* under Portico; *t,* the *Robing-Room*; *v,* the Anti-Room; X, *Entrance* to the *Catacombs*; W, *Back Portico,* of four columns, projecting out from the wall 5 feet 6 inches.

PLATE XLIV.—FRONT ELEVATION *of the same* CHURCH, *in the* GRECIAN STYLE.—The extent of the front of this building to the extremities of the antæ is 64 feet 9 inches; the breadth of the portico, at the top of the columns, is 37 feet. The columns are raised 1 foot 7½ inches above the level of the ground, and are designed from the Monument of Lysicrates; (*See Orders, pl.* XXV.) their diameter is 3 feet, and height, including the base and capital, 29 feet. The height of the entablature is 7 feet 4 inches; the architrave, 2 feet 9 inches; the frieze, 1 foot 10 inches; and the cornice, 2 feet 9 inches. The ornament which stands on the top of the cornice is 13 inches high, and is continued all round the building. The antæ are of the same width as the upper diameter of the columns, and do not diminish. The capitals of the antæ are a composition, as there are no antæ to be found in this style of Grecian architecture. The principal entrance is ascended by three steps, in front of the portico, of 6½in. rise; tread, 1 foot. Its width at the bottom is 6 feet 11 inches; it diminishes to the top, and its height is 14 feet. The side entrances are each 6 feet 7 inches at bottom, and diminish to the top; their height, 12 feet 9 inches, with an architrave round them and a cornice at the top, supported at each extremity by a console. The niches on each side of the principal entrance are 4 feet 3 inches wide, and 9 feet 10 inches high, and diminish on each side parallel to the sides of the columns.

The Attic, which stands over the cornice of the entablature, is 5 feet 9 inches high, with a dentil cornice and three fascias below. The height of the pediment is 7 feet 10 inches, from the top of the cornice on the attic.

The height of the pedestal, from the bottom of the pediment to the top of the columns round the belfry, is 7 feet 10 inches. The columns and entablature round the belfry are 20 feet 10 inches high, and are similar to those in the portico; the wall, which is seen between the columns, is rusticated above the two plinths. The apertures in the belfry, for letting out the sound, are 4 feet 2 inches wide, and 11 feet 3 inches high.

The part where the dials of the clock are placed is of an octagonal form; its height, including the two circular steps from the top of the cornice, round the entablature of the belfry, to the top of the cornice, above the dials, is 9 feet 10 inches. There are four dials in it, at right angles to each other, and four small apertures in the diagonal faces, each 3 feet wide and 4 feet high, filled in with perforated luffer boarding in the form of scales.

The part over the dials, above the two circular steps, is of an octagonal form, with eight columns supporting an entablature.

The height of the spire above the top of the pediments to the top of the cross is 44 feet 9½ inches, and this portion is ornamented with scales to the height of 28 feet 10 inches. The whole height of the steeple, from the ground to the top of the cross, is 152 feet.

Plate XLV.—Flank Elevation *of the same* Church, *in* the Grecian Style.—The whole extent of this front, including the projecting porticos on the bottom line of the entablature, is 166 feet 3 inches. That between the two extreme half antæ, on each side of the bows, is 146 feet 8 inches; and the plain part between the bows, is 88 feet 2 inches. Each of the bows is 26 feet 3 inches. The height, from the top of the steps to the top of the cills of the lower windows, is 3 feet 8 inches. The lower windows are 5 feet 2 inches wide, diminishing a little at the top, and their height is 4 feet 10 inches. The height between the under side of the lintel of the lower windows and the top of the cill of the upper windows is 6 feet 7 inches. The height of the windows above is 9 feet 6 inches; and the breadth, at the bottom, 5 feet, diminishing to the top about 3½ inches. The height from the under side of the lintel of the upper windows, to the lower line of the entablature, is 4 feet 5 inches. The height from the ground to the top of the roof is 50 feet 7½ inches. The frames of the windows to be of metal. All the ornaments on the exterior of this building may be of terra-cotta, or of stone, if built in a country where both labour and stone are cheap.

Plate XLVI.—Back Elevation *of the same* Church, *in the* Grecian Style.—This view represents the entrance to the Catacombs, the Vestry-Room, and the Robing-Room. The columns, the width of the portico, and the spaces on each side of the portico, with the widths and heights, are the same as in the front elevation. The windows on each side of the portico are similar to those in the flank elevation, and are of the same height and breadth. The width of the entrance to the catacombs, in the clear, is 5 feet 8 inches at the bottom, diminishing upwards parallel to the sides of the columns; and its height is 10 feet 3 inches. The entrances on each side of the central one, are each 5 feet at the bottom and 10 feet 3 inches high. The doors are of oak, and open in two halves. The height of the projecting part, under the portico, is 15 feet 4 inches, from the top of the steps to the top of the ornament which extends right and left. Over the central door are 3 urns, standing upon a small pedestal.

Plate XLVII.—Longitudinal Section *of the same* Church *in the* Grecian Style.—The lower part of this section represents the vaults, which are entered from the projecting part beneath the portico, at the east end, by a flight of steps descending downward. Their height from the ground to the top of the soffit of the arch is 7 feet 9 inches, and the width 6 feet.

The height of the ceiling underneath the gallery, from the level of the floor of the body of the church, is 10 feet 5 inches: the small columns, which stand upon pedestals, to the height of the pewing, and which support the gallery, are 6 feet 4 inches high, and their diameter about a ninth part of the height. The front of the gallery, over the columns, is 3 feet 5 inches high.

The height from the floor of the body of the church to the top of the ceiling, beneath the roof, is 36 feet 8 inches

The columns in the communion-place are 21 feet 4 inches high, and their diameter 2 feet 4 inches. The shafts of the columns are represented in Scagliola: the entablature over the columns is 4 feet 11 inches high.

The height of the columns in the Vestibule is 20 feet 8 inches, and their diameter 2 feet 5 inches. The height of the entablature is 5 feet, and the dome 9 feet 4 inches, from the cornice to the elliptical opening which admits the light into the vestibule from the small windows above. The height from the level of the vestibule to the top of the first platform, which leads up to the belfry, is 43 feet 6 inches; to the second platform on the floor of the belfry, 57 feet; and, to the third platform, where the clock-work is fixed, 78 feet 9 inches. The view of the part above the clock-work exhibits the manner of framing the different off-sets to the top of the spire.

Plate XLVIII.—Transverse Section *of the same* Church, *in the* Grecian Style.—This section exhibits a view on looking towards the west end. The lower part shows the arrangement of the vaults, with the passages communicating to them. The depth of the vaults, on each side of the central passage, is 10 feet; and those on the right and left of the side passages, 9 feet. The width of the side passages is 3 feet 3 inches and of the middle one 5 feet 9 inches. The openings in the exterior walls, which are sectioned, are of a circular form, and are to admit light into the vaults, by means of circular walls built in front of them, and covered with a grating.

Over the vaults is shown a section of the interior of the pews, the free seats down the middle aisle, and also the middle and side entrances to the body of the church. Upon the gallery is shown the Organ, and the side entrances from the staircases.

The breadth of the gallery, which is shown in this section, is 14 feet 10 inches from the wall, to the front of the gallery. The width of the passage is 3 feet 4 inches, and each of the pews 2 feet 8 inches. The height of the seats, in the pewing, is 1 foot 6 inches.

Plate XLIX.—Ground Plan *of a* Chapel.—A, represents the Porch, recessed within two columns; B, an elliptical Vestibule, with pilasters and niches, lighted from the top; D and C, Side Staircases to gallery with a circular staircase in one corner, leading to the children's gallery and tower.

The size of the interior of the body of the chapel is 83 feet by 58 feet. The principal passage, representing the free seats, is 8 feet within the clear of the pew-doors. The side passages are each 3 feet to the front of the seats next the walls. The pews are 3 feet wide; the seats 1 foot; the book-desk 5½ inches; and the doors 1 foot 7 inches.

The Pulpit, (*n*) is of an hexagonal form, with stairs ascending up to it; (*o*), Reading-Desk, with clerk's seat in front.

The little black circles represent the columns which support the gallery. The Communion-Place (H) is of an elliptical form, and raised 1 foot high. E, Vestry-Room, with a fire-place, and small closets in the angles; (*e*), the Strong Closet; (*g*) Water-Closet; F, Robing-Room, with fire-place, and closets of the same dimensions as Vestry-Room. G, entrance to the vaults.

Plate L.—Principal Elevation *of the same* Chapel.—This building is in the style of the *Grecian Doric*. The extent of its front, to the extremities of the pilasters, is 66 feet. Its height, from the ground to the top of the cross, is 112 feet. The entrance, or door, is raised above the level of the ground, and ascended by 5 steps of rather more than 6 inches rise, which are continued all round the building. The opening of the door is 7 feet 3 inches in the clear at bottom, and 6 feet 10 inches at the top; diminishing about one-seventeenth part of the breadth. The door is of oak; it is divided into eight panels, and opens in two halves, the height of the bead betwixt the third and fourth panel; and is hinged to a vertical bead, which runs up by the side of the architrave of the door. The architrave is about two-ninths of the breadth of the door. That part of the architrave which extends across the top of the door, is a little less. Over the architrave is a Cornice and Pediment, with an ornament at each corner, supported at each extremity of the cornice by a console.

The Columns are 31 feet 5 inches high; their diameter at bottom 5 feet 2½ inches, and at top 4 feet. The pilasters are of the same width as the top of the column. The mouldings of the caps are similar to those of

the Monument of Thrasyllus. The lower windows betwixt the pilasters, are 5 feet 5 inches wide at bottom, and at top 5 feet 1¾ in. The windows above are of the same width at bottom as those below, and at top 5 feet 3½ in. The architraves are 1 foot 1½ in. with a break at top, of about 2 inches. The bars of the windows are of metal. The cills of the windows are 11½ inches.

The height of the Architrave Frieze, and Cornice, is 8 feet. The breadth of the triglyphs is 2 feet 5 inches The height of the Pediment, from the top of the cornice to the top of the Cymatium, is 11 feet 6 inches: on the top, and at each extremity of which are placed *Acroteriæ*.

That part which projects beyond the bottom of the Cupola, is to admit light into the vestibule by means of six small windows in the faces of the pedestal of the Cupola, which is concealed within it. The windows in the belfry are 4 feet 5 inches wide, and 11 feet 6 inches high, to the top of the arch. The aperture of the latter is filled in with horizontal luffer-boarding. The pilasters round the belfrey are 16 feet 6 inches high, and 1 foot 11 inches wide; the moulding in the caps, are the same as those in the front; the bars are similar to the attic base; the height of the entablature is 4 feet 2 inches, with wreaths in the frieze, and ornaments above the cornice.

The part above the belfry, which contains the clock-work, is of an octagonal form, with a cornice and continued ornament above, similar to that on the top of the cornice of the Monument of Lysicrates, (*Orders, Plate* XXV.) The faces of the octagonal part is filled in with four dials, at right angles to each other, and four small windows, 3 feet 6 inches wide, and 3 feet high: the apertures of which are filled in with luffer-boarding, in the form of scales. Above the octagonal part is a circular dome raised upon a step, with a ball and cross over it.

Plate LI.—Flank Elevation *of the same* Chapel.—The whole length of this elevation is 142 feet between the two outer pilasters. That part between the pilasters, wherein the windows are, is 79 feet. The heights of the doors, pilasters, entablature, and cupola, are the same as those in the front elevation. The lower windows are 5 feet 4 inches wide and 4 feet 7 inches high, and diminish at the top one inch and a half: the windows above these are 5 feet 4 inches wide, and 9 feet 8 inches high, and diminish 3 inches and three-quarters at top. The architraves are 1 foot 1 inch and a half, with a break at top of about 2 inches on each side: over the top of the architrave is a cornice and a pediment, with a honeysuckle at each extremity

Plate LII.—The Back Elevation *of the same* Chapel.—The general dimensions of this elevation, in the heights and breadths, are the same as in the principal elevation, and differ only in the recesses, with the piers and arches turned over them between the antæ; and the entrance to the catacombs, with the recessed window within the arch, for lighting the Communion-place.

Ptate LIII.—Longitudinal Section *of the same* Chapel.—This section is taken through the middle of the chapel from west to east. The lower part represents the brick vaults, which are entered beneath the porch, from the east end, by a flight of steps descending downwards. The height of the vaults is 8 feet from the ground to the top of the soffit of the arch; the breadth 6 feet 6 inches, and the depth, 11 feet 6 inches. The thickness of the arches is a brick and a half. Above the arches is represented the dwarf wall, down the middle passage, (see transverse section, *pl.* LIV,) for resting the Yorkshire slabs on, which cover the vacancy where the flues are laid for heating the chapel.

The part which supports the Reading-Desk is of an octagonal form, standing upon a small plinth, with eignt insulated columns and entablature, similar to the *Tower of the Winds;* the height of the columns is 5 feet; their diameter, an eighth part of their height; and the entablature a sixth part. Over the middle entrance, against the side of the Tower, is shown the side of the organ, raised upon a platform.

The height of the pilasters in the Communion-place is 22 feet 6 inches, their breadth one-ninth part of the height, with plain caps and bases. The height of the entablature is 5 feet 6 inches. The general heights of the interior of the body of the chapel, are given in the description of the transverse section.

The height of the Vestibule, from the ground to the top of the elliptical opening in the dome, which admits the light from the small windows beneath the first platform of the tower, is 30 feet 6 inches; the height of the pilasters is 18 feet, and of the entablature 4 feet 10 inches. Over the top of the cornice is a dome, whose transverse section is a semi-circle, and longitudinal section an ellipsis, with sunk panels

radiating towards the apex. The height, from the level of the vestibule to the flooring boards of the first platform in the tower, is 46 feet; the height, from the floor of the first platform to the floor of the belfry, is 15 feet; from the floor of the belfry to the third platform, 19 feet; from the third platform to the fourth platform, 11 feet; and, from the fourth platform to the top of the soffit of the dome, 7 feet 4 inches. The dome is tied together by means of iron bars, radiating from a vertical spindle in the middle of it, and the ends of which are let into the stones and run in with lead.

PLATE LIV.—TRANSVERSE SECTION *of the same* CHAPEL.—This section represents the interior of the chapel, on looking towards the west-end, and shows the organ with the children's seats in front of it; also the doors on the gallery, entering from the staircases. The side pews, passages, and truss to the gallery. The lower part, under the gallery, exhibits the principal entrance from the vestibule, the side entrances from the stair-cases, with a section of the interior of the pews, raised upon sleepers, 5 inches above the level of the passages.

The height of the gallery, above the level of the passages, is 10 feet. The height of the columns, which support it, is 6 feet 3 inches, and their diameter rather more than 9½ inches: they are raised upon pedestals to the height of the top of the pewing, are of the Grecian Doric, and may be either plain or fluted. The height of the front of the gallery is 3 feet 7½ inches; and the height, from the ceiling beneath the gallery to the ceiling of the roof, is 27 feet 9 inches.

PLATE LV.—PLAN *of an* OCTAGONAL MAUSOLEUM.—*A*, the Porch, with two columns and pilasters in front raised two feet above the level of the ground, ascended by four steps. The intercolumniation of the columns is of the *Diastyle*, with pilasters facing the flank of each column. *f*, is the entrance; *B*, the Chapel, with eight columns of the Doric order, and pilasters behind them. The intercolumniation of the columns is of the *Systyle*. *c, c, c, c, c*, are cells for the coffins, with dwarf walls, 9 inches thick, carried up on each side, and arches turned over them; (See the *Section*.) *e, e, e, e*, represent porticos, with four columns, each projecting out from the body of the building 3 feet 9 inches; the intercolumniation of these columns are of the *Pycnostyle*. *a, a, a*, denote pedestals for figures to stand on.

PLATE LVI.—PRINCIPAL ELEVATION *of the* OCTAGONAL MAUSOLEUM.—This structure is in the Greek style, and would be suitable for a family mausoleum, placed in a retired situation on a nobleman's estate, especially if surrounded by water. The diameter of the body of the building, parallel to the front, is 49 feet 4 inches; its height 43 feet 7 inches. The columns are designed from those of the *Tower of the Winds*. Those forming the porticos stand upon a plinth, 2 feet high. The height of the columns is 19 feet 3 inches. Their proportion, eight diameters, and they diminish about a sixth. The entablature is 3 feet 11 inches, or nearly one-fourth of the height of the column. The architrave is 1 foot 6 inches; the frieze, 10 inches; and the cornice, 1 foot 7 inches. The height of the pediment, exclusive of the cymatium, is one-fourth of the breadth of the frieze. For the real projections of the cornice and architrave, see the section through EF, on the preceding plan. In the central part of the front of the building is a sarcophagus, fluted on the face, with a wreath in the centre, and over its top two reverse scrolls, with a honeysuckle between them. On each side of the sarcophagus is an urn. These emblems, supposed to contain the ashes of the dead, were used by the antients in their mausoleums. Over the central part of the body of the building is a segment dome, on the top of which is an opening to admit light into the interior.

PLATE LVII.—SECTION of the OCTAGONAL MAUSOLEUM. This section is taken through EF, on the plan, and it exhibits the interior of the Chapel, and the cells, with the coffins in them. Over the top of the cells is a tablet, on which an inscription may be made.

The columns are of the Grecian Doric, and they are raised upon a step of about 6 inches high; their height is 17 feet 7 inches; they are six diameters high, and diminished at the top 13 minutes of the base. The Entablature is designed from the Monument of Thrasyllus, the height of which is one-third of the column

Over the top of the entablature are semi-circular recesses, with busts, emblematic of those contained in the cells below. Over the top of these is a cornice, from which springs a semi-circular dome, with panels

radiating from the apex. In the centre of the dome is a sky-light of a conical form, around which is a channel, with a hole perforated in it, for carrying off the rain.

The soffits of the porticos are panelled, with roses in the centre. On the left is a female statue, standing on a pedestal, with an urn in her left hand, and a reversed torch in the other.

Plate LVIII.—Ground Plan of another Mausoleum. BB, represent porches, or entrances, with four columns, each 35 feet 6 inches by 8 feet 2 inches, in the clear; *dd*, groined passages to the chapel and cemetry, with antæ on the sides and columns at each extremity, 39 feet 4 inches in the clear of the columns, by 10 feet within the face of the antæ. Chapel, 25 feet diameter, with niches and antæ. Circular cemeteries, 20 feet diameter, each containing eight cells marked *c*. Flank cemeteries, 57 feet 5 inches in the clear of the columns, by 12 feet 4 inches within the face of the antæ, containing together 20 cells,—*d*, winding staircase to the upper plan,—*eeeeeeee*, pedestals for figures to stand on.

CC, Flank Porches, with square pillars in front, 29 feet 6 inches, in the clear, by 10 feet 6 inches. The middle or largest rectangular cemetery, which is entered by a porch, from the flank cemetery to the right, between two pedestals supporting figures, is 60 feet within the face of the three-quarter columns, by 38 feet, groined with four segmental arches, springing from the top of the entablature, which is carried round the top of the four insulated columns.

The central part is crowned with a dome of an elliptical form, with panels radiating towards the apex. In the centre of the dome is an opening to admit the light, and from which a lamp may be suspended. The spandrels below the dome are fluted.

Plate LIX.—Upper Plan of the Mausoleum. The arrangement of this plan, above the steps, within the parapet, is *peripteral*, being nearly surrounded by columns. The intercolumniations of the front and back are of the *diastyle;* and those on the flanks and interior are of the *systyle: f*, shows the top of the winding staircase; *aaaa*, walk all round the building; *gg*, a flight of steps, leading to the interior, which is entered between the antæ within the flank columns; *eeeeee*, pedestals for figures to stand on; *cc*, rooms which may be appropriated to contain the relics of the deceased.

Plate LX.—Front Elevation of the Mausoleum. The central part, forming the entrance, is 50 feet 4 inches; the front of which is in a vertical face, and the sides of the projecting part in a sloping direction, having the appearance of an Egyptian entrance. The columns are designed from the Monument of Lysicrates. The entablature is 8 feet high, to the top of the ornament over the cornice. The frieze and architrave are converted into one face, in order to give it a more massy and solemn appearance.

The entrance, within the columns, is 15 feet high, 7 feet wide at the bottom, and 6 feet 2 inches at the top. The spaces on each side of the entrance, at the bottom, above the sub-plinth, are of 22 feet 6 inches, filled in with horizontal vermiculated rustics. The piers at each extremity are 11 feet 6 inches, diminishing on the front the same as on the flanks. Within the blocking-course, and 3 feet 6 inches below the top of it, is a walk all round the building, from which you ascend by a flight of steps, of 7 feet 9 inches high, to the inner part of the Mausoleum above. The projecting part of this, with the antæ at the extremities, is, in extent, 52 feet 4 inches. The height of the columns, 26 feet 2 inches, and their diameter 2 feet 10¾ inches The width of the antæ is 2 feet 5 inches. The windows between the columns, in the clear, are 5 feet at the bottom, 4 feet 6 inches at the top, and 9 feet 4 inches high, filled in with trellis-work. In the centre intercolumniation is a figure, representing Hope or Charity, standing on a pedestal.

The height of the attic, (which is formed on the flanks by *Caryatides* holding reversed torches and urns, standing on a plinth, and crowned with an entablature,) is 12 feet 6 inches high. Above the attic rises a base, which is nearly square; and, on the top of these, three steps are raised, with pedestals at each corner; and on the latter, figures or urns may be placed.

Plate LXI.—Flank Elevation of the Mausoleum. The whole length of this front, above the sub-plinth, at the base, is 128 feet 5 inches. The central part, extending to the rustics, is 43 feet 9 inches. The parts, forming the rustics on each side of the centre, are each 31 feet 9 inches, and the extreme piers 10 feet 7 inches. The widths of the square pillars, forming the centre, are 2 feet 9 inches.

The part which stands on the steps above show the entrance into the interior, and between the three central intercolumniations the tomb is seen, which denotes where the head of the family lies.

Plates LXII. and LXIII.—Design, on two plates, for a County Court-House and Prison; by Mr. Elsam, the Architect. It embraces the Civil and Criminal Courts of Justice, together with Grand and Petty Jury Rooms, Judges' Retiring-Rooms, Water-Closets, Witnesses'-Rooms, Clerks'-Offices, &c.; adjacent to which Building are the proposed Prisons, consisting of a Gaoler's-House, Turnkey's-Lodge, Prison Buildings for Debtors and Felons, with a Chapel, Infirmaries, airing grounds, passages, and avenues of communication to the Court-House, and every requisite appendage for 300 prisoners. The entire of the Prisons, it is proposed, should be enclosed by an external and an internal boundary wall, to prevent the possibility of intrigues being carried on by persons from the outside, to effect escapes. Estimated expense, £70,000.

The arrangements of the interior of the Court-House, it is presumed, will not be considered injudicious; inasmuch as the two Courts of Justice are detached from each other, by a spacious and well-lighted circular Hall in the centre, which will admit of the most spacious communications with every part of the building not only on the ground-floor, but also in the upper story, wherein a Gallery is proposed to communicate with all the upper apartments, consisting of the Grand Jury's Dining-Room, Sheriff's-Offices, and such other conveniences as may be deemed requisite for the County Records; including Rooms for the Housekeeper and attendants.

The Prison consists of four wings, springing from a central building, which comprises several well-sized apartments, with a circular staircase in the centre, and passages of communication to every part of the building; each of which apartments, with the Chapel at the top, have windows diagonally situate, and commanding full views of the several Court-Yards; so that each Class of Prisoners may be inspected, not only on the ground-floor, but from each of the upper stories; and, as this part of the building is intended chiefly for the use of the resident Gaoler, or Inspector, it is presumed, that a Prison built upon this plan could not fail, with due attention, to be minutely inspected, and consequently very secure: more especially, when it is considered, that the approaches to the central point are, by means of the external avenues and the divisional passages, to be ascended by flights of steps; and, as shown, the internal Court-Yards in the form of quadrants, are intended to be elevated several feet above the Prisoners' airing grounds, in order to afford the Inspector, or Gaoler, the most convenient opportunities of viewing the interior of the Prisoners' Court Yards, between the circular iron railings.

The Turnkey's-Lodge is proposed to be situate in the centre of the principal front of the boundary-wall, and is intended to comprise suitable apartments for the Principal Turnkey and his family, with a hot and cold bath, fumigating-room, and store-room for County clothing, besides a place for public executions on a lead flat at the top.

The Four Wings, or Prison Buildings, are each of them divided in the centre by a building similar to the central building before described, the former of which are intended for the under Turnkeys, and the superior description of Prisoners; each of which buildings have, also, circular staircases in their centres, with passages of communication to the several airing grounds, dining-halls, and work-rooms, which should be flagged or groined over in brick-work, and suitably fitted-up for the purposes intended. The upper stories of the several prison buildings are each alike; and, in the event of the design, or any portions thereof, being carried into effect, the spaces above stairs should be divided into the same number of compartments as the groined arches or piers represent, which will produce the same number of sleeping cells on each of the three upper stories; and these, being flagged or vaulted over, and secured with barred iron window gratings, and strong door locks and bolts, may be considered perfectly secure.

The uppermost stories of the centre buildings comprise the Infirmaries. Water-closets should be provided within the buildings, and the utmost care taken to ventilate and well drain. The mode of drainage is a subject of the greatest importance; as is also the acquirement of good and wholesome spring water.

References to the Ground Plan.—A, Great Hall: B, Criminal Court: C, Civil, or Nisi Prius Court: D, Judges' Retiring Rooms: E, Petty Jury's Retiring Rooms: F, Staircases; G, Grand Jury Room: H, Clerks' Room: I, Witnesses' Room: K, Waiting-Rooms: L, Clerk of the Peace's Office: M, Witnesses' Room: N

Clerks' Rooms: O, Portico: P, Yard of communication, with Privies: Q, Yards for females about to be tried: R, Yard for males about to be tried: S, airing grounds for eight classes of prisoners: T, Inspection-yards: V, Gaoler's house: U, Under-Turnkey's, and superior prisoners: W, Dining Halls and Work Rooms: X, Gaoler's passages: Y, avenues between the boundary walls: Z, Turnkey's Lodge, &c.

PLATES LXIV & LXV., DESIGN, *on two plates, for a* SMALL COUNTY PRISON; *by Mr. Elsam, the Architect.*—The DESIGN which accompanies this explanation, was executed at Cavan, in Ireland, in the year 1810, and cost £12,000. Since that period it has been adopted, with some deviations, in various parts of the United Kingdom; and latterly, the design has been laid before the Prison Committee of the House of Commons, and other public bodies, who have been pleased to testify their approbation of the principle of its arrangements: and these circumstances have induced the author to extend its publicity, through the medium of this work, in the hope that it may induce other professional men to elicit their ideas upon the subject.

The PLAN comprises three wings, besides a central building, called the *Gaoler's house,* with a Turnkey's Lodge, situate in the principal front of the boundary-wall, which encloses the different airing grounds and the several buildings, as before described.

The centre building, on the ground floor, comprises the *Gaoler's apartments,* from whence the principal Court-yards may be inspected. The first floor comprises the *Chapel,* to be divided and sub-divided as occasion may require; and the second floor, the *Infirmary,* to be divided in like manner. This building will also afford suitable accommodation for two or three female debtors.

The *Left Wing* will accommodate 16 debtors, with sleeping rooms in the upper stories; besides a spacious day room on the ground floor, which should be fitted up with every convenience the place will admit of, to ameliorate the condition of this class of unfortunate persons.

The *Right Wing* will also accommodate 16 prisoners, with sleeping cells in the upper stories, to be divided, as described in the references, for persons under their respective sentences; as likewise those for misdemeanors.

The *Rear Wing* will also accommodate 16 prisoners, accused of felony, with separate sleeping cells in the upper stories, besides day rooms on the ground floor; for each of which classes, the plan provides separate airing grounds, with detached privies.

The *Staircase,* in the centre, will communicate with every part of the building, through which the different classes of prisoners are proposed to be removed, alternately, from their respective day rooms and sleeping apartments, every morning and evening: by which arrangement it will be difficult for any prisoner to make an escape, and in this respect, the plan is different from any other design of the same description.

The *Turnkey's Lodge,* provides apartments for that officer, with sleeping cells for female felons, King's evidences; a room for county clothing, a hot and cold bath, and a place for public executions in the most conspicuous part of the building: attached to which, are two airing grounds under the inspection of the Turnkey.

By the preceding distributions, it will be seen that a prison, built upon this plan, will conveniently lodge and secure from 50 to 60 prisoners, in the ratios of persons usually confined in small County Prisons, where the number of debtors, and the proportionate quantity of other prisoners, do not require an extensive classification.

References to the Ground Plan.—A, Gaoler's Apartments: B, Debtors' Day room: C, Misdemeanors Day Room: D, Day Room for prisoners under sentence: E, Day Room for accused Felons.

F, G, H, I, K, L, M, N, Airing Grounds: F, for Debtors: G, for Misdemeanors: H, for Prisoners under sentence: I, for accused Felons: K, for King's evidence: L, for women Felons: M, for female Debtors: N, for refractory Prisoners: O, Turnkey's Hall, or Lodge: P, Hot and Cold Baths: Q, Fumigating Room, with an oven: R, staircases: T, privies.

The sleeping apartments for the Debtors, and Cells for the Felons, are proposed to be in the upper stories: this is recommended, not only for the sake of security, but likewise to produce a free ventilation throughout, which cannot be better effected, than by the alternate removal of each class of Prisoners from their several day rooms and sleeping apartments every morning and evening.

PLATE LXVI.—GROUND PLAN *of the* MIDDLESEX COUNTY LUNATIC ASYLUM, as built in 1830, but is now being completed according to the original designs; with observations on the choice of ground, &c.

Although no single place may afford all those conditions which ought to be found in an unexceptionable site for a Lunatic Asylum, yet it is not the less necessary that those conditions should be considered with the most serious attention; that our views regarding them may be as extensive and as complete as possible, both to assist in fixing on the most eligible spot, and in its improvement, if necessary.

The first thing to proceed with is the general aspect and exposure; next proceeding to consider the quality of soil, its products, and appropriation in the immediate vicinity; thirdly, of the qualities and influence of water; and lastly, of air. In regard to aspect, it is worthy of remark, that one which is capable of exciting agreeable feelings, an ascending approach, terminating on a comparatively level site, is generally desirable; and its exposure southwards, its shelter to the north, and if the dip of the ground should be a little to the east of south, it would render the general aspect of the morning more cheerful and reviving, and also be less exposed to the prevalent winds.

The nature of the soil is important, both on account of its qualities and the nature of its products; even the colour of ground has a considerable effect on the air and character of the place. Dark mould absorbs heat powerfully, and produces much vapour, and often of a deleterious kind; the lighter coloured species of earth are less heated, because they reflect more of the sun's rays. Where clay predominates in a soil it is retentive of moisture, and is cold and damp, and when iron is much diffused in it, there is unfruitfulness in proportion, except in worthless mosses and the like. Siliceous sands and gravels having no affinity for water further than capillary attraction, soils where they abound are dry, easily drained, and productive of a healthy vegetation. In the state of limestone its effect varies as the character of the stone; the less earthy it is in its nature, the more healthy the country of which it forms the chief portion of the surface.

The products of a soil depend partly on its composition and partly on its condition as to water, and not in a small degree on the purpose to which it is most beneficial to the owner to employ it. Pasture lands bearing healthy grasses in moderate luxuriance are most healthy when dry; next in order are arable lands of analogous qualities: meadow lands are less so; and water meadows are objectionable: wood lands are not favourable in a close flat country. Having a soil so generally retentive of water, they interrupt the free circulation of air, and retain a damp and cheerless atmosphere round them, which the strength of a storm is required to dispel: single trees, and groups properly disposed, are rather beneficial than otherwise, the objection being urged only against continued belts, large woods, and close plantations. Market-gardens, swamps, marshes, bogs, and the like, are too obviously bad to need comment; hence the vicinity of such places ought to be avoided.

In regard to WATER, it is desirable that a supply should be available from a pure and abundant source, for the use of the establishment, and at a moderate expence. If the water contain so much earthy salt in solution as to render it hard, perhaps some less abundant source may be found, where the water is soft and in sufficient quantity for the purposes requiring soft water; as for the larger portion of the water required, hard water is as good as soft, and it is most desirable to have both, if both can be easily procured. Water containing putrescent vegetable matter should be avoided if possible, or, indeed, any substance in solution; the more pure natural water, it is in all respects the better. Rain-water may be collected in considerable quantity, and may be rendered very useful, but for potable water it is at least questionable whether it be so good as water which has filtered through the earth, and slowly acquired the quantity of fixed air which renders it agreeable; and it is essential to state that the term pure water is here applied only to the kinds which are agreeable to the palate, that is to say, natural water; that which is distilled is chemically pure water, but water so deprived of air, and, consequently, in a state to absorb air on being used as drink, may in most cases, be injurious.

In regard to AIR, the most important point is to avoid the possibility of the air being stagnant in any part of the neighbourhood; and particularly round the buildings: all places and all parts should be accessible to the sun and wind in as great a degree as convenience will allow. The influence of the sun is obtained in a more complete manner by making the buildings front one of the quarter points of the compass, instead of the common practice of making the faces correspond with the cardinal points. In regard to winds, the south-west are most frequent, hence partial shelter from these may be considered an advantage; but there should be

no place inaccessible to winds of rather frequent occurrence, and where the natural direction is not suitable it may be changed by the disposition of trees, &c.

The great advantage of frequent change and motion in the air is sufficiently obvious, only in one respect it has been little considered; stagnant air acts more powerfully in decomposition than air in motion, and once in contact for some time with decomposing matter, it acquires, in some degree, the nature of a ferment, and has considerable influence in disposing the bodies to decompose; the marsh poison is probably nothing more than air, which, by being stagnant over putrescent matter, becomes a ferment to renew a similar process in the system of those who inhale it. The great receptacles of stagnant air are valleys in directions rarely traversed by the winds, basin-shaped hollows and dells, and the most noxious sources of bad air, the muddy borders of a stagnant piece of water or dull stream.

It is desirable to state the order in which the design may be considered. First, The design should be considered as an object of taste, as to fitness, propriety, &c. 2ndly, As to distribution for convenience and health, for classification and access, and as relates to economy, additions, &c. 3rdly, The construction of the parts, for safety, strength, security, and cleanliness, the modes of drainage, &c.; and lastly, of the means of supply with air, water, heat, and light; each of these involves a vast inquiry into minute circumstances, which few, except professional men, have resolution to engage in; but it is obvious that they ought to be inquired into in the most careful manner before the erection of the building be commenced, in order that it may be a model for the guidance of all others, and worthy of the magistrates of the metropolitan county of the British empire

1. As a work of taste, the design should excite a hope of cure: it should look gay and cheerful; a dense, heavy, and formal mass of building should be avoided, and every thing which conveys the idea of great numbers in a state of confinement; for a building may be rendered amply secure without being in appearance a place of imprisonment. The ground should be laid out with taste, but in the most simple style, and with a view to their being kept in order by the convalescent; and the bounding enclosure so arranged as to prevent the interference of idle curiosity, as well as to obstruct as little of the prospect as possible. No ornament conveying the slightest allusion to the state of the patients should be allowed, no useless columns for effect, nor heavy cornices to connect them; but simple neatness and solidity, produced by plain but well-proportioned masses.

2. Distribution may be considered in regard to light and air, to separation and access, inspection, &c.; to night and day convenience, and, on principles of economy, courts enclosed on the four sides exclude the wind, and, therefore, have no natural ventilation; and as the shadow of a building extends to a great distance when the sun has south declination, it is clear that courts must exclude the effect of sun and air for a long period of the year.

3. Another object of consideration is construction. Where a number of people are to be collected together in different stories of a building, it appears to be a necessary precaution to render it fire-proof, and so necessary that it is very generally acted upon; but it is doubly so, when the persons are either confined, or incapable of escape; and in a place for insane people it has the further advantage of greater security, of being more easily kept clean and wholesome, and of being more durable in consequence of the materials not being liable to dry-rot, or other sources of decay. The greatest disadvantage of the usual fire-proof construction is the coldness and dampness of the floors of stone, as Yorkshire or other argillaceous sand-stones used for paving, attract moisture from the air, and turn black with damp in damp weather; and, consequently, form a comfortless floor. A better, a stronger, and a cheaper floor would be formed by clinkers (either Dutch or English) set in roman cement; such a floor would be like a stone in one piece, and by having a descent to a proper channel, might be most effectually washed with very little trouble. A brick floor is next to a wooden one in comfort.

The lower part of the walls in the cells for the refractory are sometimes lined with wood, but these might be more effectually done at a less expense, by a coat of roman cement finished smooth.

In the cases where the transmission of sound should be prevented, hollow walls are desirable; and, indeed, it would contribute materially to the comfort and strength of the building to make the whole of the outer walls hollow; also, in some parts double floors may be required, to prevent the passage of sound.

PLATE LXVII.—PERSPECTIVE VIEW *of the* BUILDING COMPLETE.—By comparing the two plates, it will be seen, in the plan, that two wings and two towers have been omitted in the plan, which are now being built, without interfering with any of the previous arrangements.

The buildings on the eastern side are appropriated to the male patients, and those on the western side to the females.

The centre tower contains the Chapel, the Superintendant's apartments, the Committee Room, four Day and Dining Rooms, and an extensive basement story unappropriated.

The eastern tower contains, in the second story, apartments for convalescent patients. On the first story Day and Dining Rooms; on the ground floor, Apothecary's Shop, the Office and Receiving Rooms, Day and Dining Rooms; and the basement story, Workshops.

The western tower contains, in the second story, apartments for convalescent patients; on the first floor, Apothecaries' apartments, Day and Dining Rooms; on the ground floor, Receiving Room and Assistant Matron's Rooms, and Day and Dining Rooms; the basement is appropriated to unclean patients.

The sides of the quadrangle, between and adjoining the towers, contain the Galleries and Sleeping and Sick Rooms of the patients.

The building at the south-east angle contains the Kitchen, Scullery, Bread Room, Servants' Hall, Beer Cellar, Dairy, Ice House, and Larder.

The building at the south-west angle contains the Infirmary, Servants' apartments, Provision Room, Cellaring, &c.

The office buildings, on the east side, contain a Bath, Gas House, Seed Room, Foul Linen Room, Steam Boiler, for warming and cooking, Drying Closet, Brewhouse, Bakehouse, and Straw Rooms.

The office building, on the west side, contains a Bath, Store Room, Laundry, Drying Closets, Wash House Linen Rooms, Straw Rooms, Steam Engine, Steam Boiler, for warming and drying.

The farm yard behind contains the Cow House, Piggery, Stabling, and Coal Sheds; Poultry Houses, Rabbit Warren, Tool House, and Vegetable Room. The kitchen garden is enclosed with a wall 11 feet high, and the grounds in general are inclosed by a light fencing. An orchard is also enclosed on the western side, and a cemetery on the southern side.

A Lodge formed at the entrance (not shewn in the plates) is occupied by the principal gardener, and contains Coach Houses and Stabling for the Committee.

The entire site contains *fifty-five acres*, and is bounded on the east by the river Brent; on the south by the Grand Junction Canal; on the west by land belonging to Lord Jersey, and on the north by the Uxbridge Road.

It will be seen, by comparing the plan with the perspective view, that some variation has been adopted in laying out the grounds in front of the building.

This Asylum is built on an elevated spot, in the parish of Hanwell, and on a bank of the river Brent, into which the whole of the drainage is conveyed. It also adjoins the Grand Junction Canal, from which it receives coals and other necessaries by water carriage. The soil is a fine dry gravel, and its elevated situation commands extensive views over some of the finest parts of the country. Its contiguity to the public road renders it very desirable, on account of the easy transit of the unfortunate inmates, who are sent by the various parishes in the county. The air is equal to any part of the county for its salubrity; and from the great attention which has been paid in the construction, in every respect, of this Asylum, calculated to alleviate the sufferings of those unhappy beings confined within its walls, the best hopes are entertained of its proving an important advantage to the county, and also to the cause of humanity.

These extensive buildings were erected from designs and under the direction of Robert Sibley, Esq.

PLATE LXVIII.—PLANS *and* ELEVATIONS *of* ST. PETER'S, *at Rome, and* ST. PAUL'S, *London.*

The design for St. Peter's Church was made by Bramante, of Urbino, by direction of Pope Julius. This great work was begun with much zeal, in 1506, but suffered a serious interruption by the death of the Pope and the Architect, which took place in 1514. It was afterwards continued, under twelve architects, during 135 years. The plan was considerably varied under Leo the Xth, by Baldassa Peruzzi; and many parts of the elevation, and the whole of the dome and cupola, as executed, were designed by the celebrated Michael Angelo Buonarotti

In the plan, the great western entrance bears some resemblance to that of the Temple of Peace, having seven passages into a porch 230 feet long and 40 feet wide. The areas of the nave, choir, and transept form a perfect Latin cross. The space which encompasses the plan of the dome, with its supporting piers, forms a parallelogram, having a small circle at each angle, the whole being admirably disposed for simplicity, strength, and magnificence. The side aisles, instead of being each of consequence, when taken lengthwise, seem rather to consist of a number of distinct chapels, ranged along each side of the nave; but the whole interior of the fabric is so completely occupied by pilasters, columns, recesses, and niches, that nothing is left imperfect; and the breadth of the ground plan being so great in proportion to its length, conveys an idea of stability.

The dome forms nearly an ellipsoid on the exterior, rising vertically from the base, and, at the height of about 50 feet, branches into two thin vaults, separating gradually as they rise. Thin partitions are dovetailed into each shell, to connect the two together; so that the whole is rendered at once light and firm.

A building composed of columns and pilasters, 9 feet diameter, and the whole order upwards of 100 feet high, upon a façade of 400 feet, and of nearly double that extent, when taken in perspective as far as the transept, is certainly one of the most imposing objects which art has accomplished. A dome resting upon a pedestal, encompassed by a colonnade 50 feet high, having its base elevated 200 feet above the surface of the earth, also commands an equal degree of admiration, for the extent of the outline rivals the Egyptian pyramid, and the skill displayed in the construction far exceeds any thing connected with these enormous heaps of almost rude stones. But while we admit, in the fullest extent, the merits of this magnificent work, we consider it our duty to notice defects, which appear to lessen the effect which it might have produced.

To those accustomed to examine the outlines of the façade of the Greek temple, the portico of the Pantheon, at Rome, or of the Square House, at Nismes, in France, and who have considered the associations they produce, it will be evident that the multiplicity of breaks in the western façade destroy the simplicity of the horizontal lines of the entablature, which ought to represent wooden beams; the mind is perplexed how timber could be worked or connected in this manner, and is provoked to observe this deviation without any good cause.

The same objection is more palpably evident in the colonnade which encompasses the pedestal of the dome; here the columns are placed in pairs, and there is a break over each pair, by which their connection with each other is totally interrupted. In the great order, the pediment, instead of being rendered a bold feature, by extending over the whole space where columns are introduced, and thereby affording room for sculpture (the only purpose in a square front which renders a pediment admissible), is confined to four columns only, a thing unfit even in a private dwelling. Instead of preserving the face of the building plain and simple, to accord with its great outlines and gigantic order, the entrance door-ways are of various dimensions and shapes, and the whole building is covered with small tablets, and perforated with small windows, even the dome itself, circumstances much to be regretted.

We shall now place our great metropolitan edifice, St. Paul's, in comparison with what has been just described.

The plans and elevations being drawn to the same scale, the comparative size of each to the other may be fairly appreciated. This comparison renders the disparity in point of size very conspicuous; but when it is considered that the Italian temple was constructed at the joint expence of all the richest countries in Europe; and that the English temple was built at the expense of that nation alone, and immediately after the city had been destroyed by fire, in 1666, its magnitude will appear not a little surprising. In taste and scientific skill, Sir Christopher Wren, the architect, was fully equal to any of his predecessors in this school; but the funds being limited, and materials of large dimensions not easily procured, he was prevented from adopting his favourite design, and obliged to substitute one in which the individual members were more minute.

In the plan of the building, as executed, the dome is placed nearly in the middle of the length of the nave, or middle aisle; and as the terminations of the transept are square, the shape of the cross is not only *internally* different from that in St. Peter's, but is *externally* more distinctly defined. In St. Peter's, the length of the middle aisle, from the western entrance to the extremity of the choir, is only about eight times its width. In St. Paul's, it is above eleven times, which adds much to the imposing effect of the internal perspective. The breadth of the side aisles in St. Paul's bears a greater proportion to that of the middle one, and the form is more distinctly continued through the whole length of the edifice, than in St. Peter's. The piers which

support the dome are, in St. Paul's, well disposed to afford stability, without too much crowding the space on the pavement. Immediately under the dome, a greater degree of simplicity would have been preserved, if the entire order had, as in the original design, reached sufficiently high to receive the whispering gallery upon the entablature, instead of resting, as it now does, upon large arches and their spandrels. Externally, the height of St. Paul's is greater, in proportion to its breadth, than St. Peter's, but not so much as materially to lessen the idea of stability, which is also well preserved by the square terminations of the projecting part of the transepts. This relative proportion creates a greater degree of apparent elevation than if the edifice had more breadth. The dome is elegantly shaped, and the pedestal, or neck, upon which it immediately rests, being considerably raised, is the means of shewing the dome to advantage, while the order which supports this neck, having its columns supported at equal distances, and well relieved, and having its entablature continued quite round, without any break, presents a feature which far surpasses that of any other structure of the kind.

The dome has also its simplicity well preserved, by being clear of those pitiful small windows which disgrace St. Peter's. A radical defect in St. Paul's, is its having two orders in the height of the elevation, by which the simplicity and grandeur of the general effect are much diminished; but in the western façade, the upper and lower porticos occupy a considerable portion of the breadth, being also well isolated, and having a pediment, enriched with sculptures, extended over eight columns, produce altogether an imposing effect.

The manner in which the Turrets are constructed and finished has little claim to commendation. The smallness and varied shape of the windows are objectionable. If there had been niches with statues, instead of windows, in the lower order, and the windows of the upper order made as large as the space would admit, and of uniform shape, the whole would have been more conformable to the character of a temple. We are aware that this would have required a considerable change of the interior arrangement. The engravings we have given will convey a distinct idea of the plan and elevation.

It required seven years to prepare the materials of this noble structure, and on the 21st of June, in the year 1675, the first stone was laid, and the whole work finished in 1723. The expense of this building was between 7 and 800,000*l*.

Plate LXIX.—Plane Scales, &c.—The Scale is so called from a Greek word, which signifies a wooden measure of length, and is a thin broad rule of wood, ivory, or brass, divided into different lines, of various names and use. The best and most useful scales, for architectural purposes, are represented on the plate, of the exact size in which they are usually made. The graduations in the plate have been made with such care, that we believe it may be relied on, for practice, by such as have not the instruments at hand.

In this plate, *figure* 1 represents the Protractor or Semi-circle, projected in form of a parallelogram, either for laying off or measuring angles, and numbered both from right to left, and from left to right, to 180 degrees.

Figure 2, exhibits the back of the same scale, and it contains six lines of *equal parts,* with a *Decimal Diagonal Scale,* for *plotting,* or planning. The first have sub-divisions, both for decimals and inches; and the larger figures at the end of the lines show how many decimal parts are contained in one inch, as from 30 to 60. The *diagonal scale* is sub-divided to hundredth parts of one half and one quarter of an inch: its principle and use will be obvious on inspection; as it may be seen that the perpendiculars are divided into ten equal parts, and through the divisions parallel lines are drawn, of the whole length of the scale. Again the length of the *first* division is divided both at top and bottom, into ten equal parts, and the points are connected by diagonal lines, so as to take off dimensions or numbers of two or more figures.

Figure 3 represents the face of another plotting scale, which contains *lines of chords,* of different radii; and *equal parts, for feet and inches.*

Figure 4 represents the back of *fig.* 3, and contains another set of plotting scales, for half an inch, one quarter of an inch, three-eighths, and one-eighth, of an inch, to the foot, &c. and sub-divided diagonally for greater accuracy. The uses of these are too clear to require further explanation.

Plates LXX. to LXXVII. are described on pages 126 to 129.

Plate LXXVIII.—The Centrolinead is an instrument used in Perspective, &c. and invented by Mr Peter Nicholson, for drawing lines to an inaccessible or vanishing point.

Figure 1, represents the instrument now in use. It is constructed with two legs, about a foot long, with

a joint in the angle, similar to a carpenter's rule. The centre of the knuckle is pierced with a small hole, (*fig.* 2,) in which a pin is rivetted, in order to admit of a blade being fitted on it, for drawing lines to a point. The drawing edge of this blade is made to pass through the centre of the joint; and the blade screwed to the two legs, may be fixed at any required angle. The edge of the blade and the edges of the two legs, all tend to the same point. The blade is made to reverse, so as to draw lines to either side of a building: the same legs will answer to blades of various lengths, as occasion may require. In complex drawings, it will be convenient to use a distinct centrolinead for each point, to prevent the trouble of frequently adjusting the instrument.

Figure 2 exhibits the instrument on a larger scale, with part of the legs and the blade broken off.

Figure 3.—The joint fixed to part of the legs. The figures No. 1, No. 2, No. 3, No. 4, No, 5, are the detail of *figure* 3.

Figure 4.—Brass fixed to the blade and legs, by means of three screws, so as to fasten them together, as represented in *figure* 1.

Figure 4, No. 1, edge of *figure* 4, with part of the edge of the blade fixed to the brass, by a screw, and two pins to steady it.

Figure 5 shows how a T-square may be made into a centrolinead, by fixing a piece in the form of a wedge to the stock of the square.

Figure 6.—A diagram, showing the figure where the points form for working the instrument on, when the legs of the instrument are at different angles, to draw to the same vanishing point.

Plate LXXIX.—Mode *of* Setting *the* Centrolinead.—Draw two lines tending to the vanishing-point, or to the station point, which must be found by a problem: then put two pins in vertically, over each other, on each side of the line without the space, making the distances on each side of the line nearly the same. Press the two edges of the legs, which run to the centre of the joint, against the pins, and move them along till the edge of the blade, which passes through the centre of the joint, coincides with the line or crosses it; then loosen the screw that fastens the blade to the leg of the centrolinead, and press the legs gently against the pins till the blade coincides with the line: then fasten that screw, and loosen the other; next move the instrument down to the other line; and, if the same edge of the blade coincides with the line, fasten the screw, and the instrument is set: but if not, proceed, as above, till the edge of the blade coincides with the two lines; it generally requires three settings; the least number it can have is two, that is, one for each angle. The centrolinead may be clamped at once, in the manner following: Draw a line between the two given lines, so as to be terminated by them, set each of the angles of the centrolinead to each angle formed by the cross line; put a pin in each angular point, formed by the cross line, with each of the given lines; then placing the central edges of the legs upon the pins, one on each, draw lines by the central edge of the blade, and those lines will tend as accurately to the point as if they were drawn to it by a longer ruler.

Plates LXXX. to LXXXIII. are described on pages 130 to 136.

Examples of Gothic and Norman Architecture.

Plate LXXXIV. represents a section of part of Waltham Abbey, Essex; and part of the church L'Abbaye aux Dames, at Caen, in Normandy; and also part of the Apsis of the church of St. Nicholas, at Caen. These are considered fine specimens of the Norman style, and worthy of the consideration of the young architect.

Plates LXXXV. and LXXXVI.—Elevation, Plans, *and* Details *of* Waltham Cross.—This cross was erected in memory of Queen Eleanor, wife of Edward the first, about the year 1250. This elegant building has been lately repaired, by subscription of the neighbouring gentry, under the direction of Mr. W. B. Clarke. For its size, Waltham Cross may be considered one of the finest examples of the style this country possesses, and although commenced at the end of the thirteenth century, may rather be considered an early example. Flaxman, in his lectures, praises in high terms the statues of Queen Eleanor, at Waltham Cross

Plate LXXXVII.—The King's Palace, Pimlico.—Front or entrance elevation, from St. James's Park The length of each wing is 150 feet, the centre 185 feet, making an extreme length of 485 feet; the centre

of which is a parallelogram, recedes from the wings 340 feet, forming a court, through which the carriages pass and drive under the portico, in the middle of the principal building; between the wings, and situate about 100 feet in advance, is an entrance lodge, consisting of three archways built of white Carrara marble, assimilating in design to the triumphal arch of Constantine, at Rome; the whole court from the wings to the lodge being enclosed by a richly ornamented bronze railing, and placed in the position shown by the dotted lines on the Plan. The external appearance of the ground-floor is of the Doric, and the principal floor of the Corinthian order, richly embellished with groups of illustrative figures and statues.

The entrance hall is splendid, and paved with variegated marble; the walls are lined with Scagliola; and the frieze of the ceiling supported by columns of white marble, with Corinthian capitals of mosaic gold.

The staircase, which is of solid marble, ascends on each side of the great hall, and leads to the state rooms and picture gallery, which are magnificent.

The south wing is appropriated to the king's, and the north wing to the queen's private apartments.

The palace is erected upon the site of Buckingham House, and the alterations were commenced by J. Nash, Esq., and have been finished under the superintendence of Edward Blore, Esq.

PLATE LXXXVIII.—NATIONAL GALLERY *for the* EXHIBITION *of* PAINTINGS, SCULPTURE *and* ARCHITECTURE.—This erection extends from St. Martin's Lane to Pall Mall East, and embraces the whole of one side of Trafalgar Square. It is about 425 feet in length; and it is composed, as is usual in buildings of this description, of a centre and wings. The style is of the Corinthian order, and the centre has rather an imposing effect when viewed from Whitehall, as it also has from the corner opposite the Union Club House, from which situation it is put in juxtaposition with the beautiful outline of St. Martin's Church. This structure has been erected from the designs, and under the superintendence of William Wilkins, Esq.

PLATE LXXXIX.—HOLFORD HOUSE, REGENT'S PARK.—Plan of the principal floor and south elevation of the house belonging to James Holford, Esq. Its extreme length is about 185 feet, and width about 120 feet, and is fitted up both externally and internally in the costume of the Corinthian order. The various rooms of the principal story will be seen by referring to the plan, and their dimensions by applying to the scale. Architect, Decimus Burton, Esq.

PLATE XC.—GOLDSMITHS' HALL, CITY.—This edifice has been carried into execution from the designs and under the superintendence of Philip Hardwick, Esq., on the site of the old Hall, with increased dimensions, its present length being nearly 160 feet, and breadth 120 feet. The style of architecture adopted is the Roman Corinthian, and is very rich in its arrangements; but unfortunately from its confined situation the effect is destroyed. The rooms on the principal story are sufficiently explained on the plan, and the proportions of the elevations will be found by applying them to the scale.

PLATE XCI.—FRONT ELEVATION *of* WESTMINSTER HALL.—This beautiful structure was erected by William Rufus, or William II. about the year 1097, and is the admiration of every one of taste who views it.

PLATE XCI. 2.—*An* ELEVATION *of part of the* NORTH SIDE *of* HENRY VII.'s CHAPEL, WESTMINSTER ABBEY.—This edifice may be justly considered as the finest example of the perpendicular style in this country, and has always been admired by men of taste and science.

PLATES XCII., XCIII., and XCIV., represent parts selected from the CATHEDRAL *of* LINCOLN.—These are examples of both early and decorated English. The greater part of the present fabric was erected between the year 1186 and 1200. The whole east end, beyond the upper transept, which in beauty of design far surpasses every other part of the edifice, is stated to have been erected about 1250. The vaultings of the side aisles are 40 feet high, half the height of the centre vaulting. The ribs of both are few, and simple in their arrangement. The ribs and bosses are of stone, but the intermediate parts are of rubble faced with plaster.

PLATE XCIII. 2.—ELEVATION *of the* CATHEDRAL *of* FREIBURG, in Breisgna on the Rhine.—The spire is considered by architects and travellers the most beautiful specimen in all Germany.

PLATE XCV.—ELEVATION *and* DETAILS *of the* PALACE GRIMANI, on the Great Canal, Venice.—This beautiful Italian specimen of Gothic architecture is well worth the attention of the student and the curious. We have endeavoured in this plate to give an example of the domestic architecture of the Venetians. The date is uncertain. This style of architecture is very common at Venice, and predominates in the palaces of the great families erected previous to the introduction of Palladian architecture.

Plate XCVI.—Examples *of* Gothic Sculpture of the thirteenth century.—Nos. 1 and 2 are specimens of sculpture of the thirteenth century. No. 3 was found in Westminster Abbey, the date uncertain; it may, from the similarity of style, be considered to have been executed about the same period. The remaining examples, Nos. 4 to 12, are from Lincoln Cathedral, and are remarkably fine, both for their design and execution. It is worthy of remark, that a great taste for sculpture prevailed about this period, particularly where the style of the antique was introduced. To this circumstance may be ascribed the excellence of the art as then practised. In the partial exposure of the naked form, and style and arrangement of the drapery, on the figures over the porch at Lincoln, a strong resemblance to the antique may be traced.

Plate XCVII.—Elevation *and* Plan *of the* Hall *of* Christ's Hospital, lately erected, from the design and under the superintendence of the late — Shaw, Esq. This may be considered an example of the perpendicular style of Gothic architecture. It is worthy of notice, that, although the perpendicular style is the richest, yet, in the present day, from the circumstances of capital being applied to more useful purposes than the mere decoration of buildings, Gothic architecture is for the most part executed with very little ornamental decoration.

Plate XCVIII.—South Elevation *of the* New Church, Chelsea, designed and executed by Mr. Savage. It was commenced about the year 1820. This structure is finely proportioned, though not highly decorated. The style may also be considered perpendicular.

Plate XCVIII. 2.—Elevation *of the* Cathedral Church *of* Notre Dame, at Paris.—This is a fine ancient Gothic building, but is more remarkable for its strength than the elegance of its architectural symmetry; it was erected and completed at several times.

Plate XCIX.—Elevation *and* Plan *of part of the* Lady Chapel, St. Saviour's, Southwark.—This building, which has been lately restored, by subscription, is a fine specimen of early English architecture.

Plate C.—North Elevation *of the* Church *of* Bathalha.—This represents a portion of the Church of Bathalha, in Portugal, the object being in this and some other of our plates to present to the reader some interesting and fine examples of Gothic architecture of other parts of Europe, to enable him to form a comparison of their merits.

Plate C. 2.—Section *of the* Basilica *of* St. Francis, at Asisi.—This most elaborate and richly decorated specimen deserves minute consideration and inspection. This edifice is remarkable for the painted decorations with which it abounds; all those ornaments which are usually in other buildings carved, are here represented in colours.

The total number of plates to this volume (double and single) is *one hundred and twelve*, and ninety-three wood-cuts. Although the plates do not follow *numerically*, owing to the mistakes of the engraver, the whole are described according to their respective numbers, and as referred to the Directions to the Binder.

Plate CI.—Stafford House, St. James's.—Now the town residence of his Grace the Duke of Sutherland, was originally intended for his late Royal Highness the Duke of York. It was commenced from the designs, and uuder the superintendence of Messrs. Benjamin and Philip Wyatt; but has been completed under the direction of Sir Robert Smirke. It is of the Corinthian order. The extent and proportions will be sufficiently explained by referring to the scale under the elevation.

Plate CII.—Plan *and* Elevation *of* Westminster Hospital.—This building has been erected from the designs of Henry William Inwood, Esq. It is in the Gothic style, and is of large dimensions, and is equal to any other establishment of a similar description in the metropolis. The arrangements of the various wards and other apartments will be seen by the ground plan, and their dimensions, as well as the proportions of the elevation, will be acquired by applying to the scale.

Plate CIII.—Plan *and* Elevation *of the* General Post Office, London.—This building was designed and carried into execution under the superintendence of Sir Robert Smirke. It is of the Ionic order. The basement is composed of granite and rendered fire-proof, and the superstructure of bricks faced with Portland stone; the extreme length is 400 feet, the width 80 feet. The vestibule which occupies the centre of the edifice forms a thoroughfare from St. Martin's-le-grand to Foster Lane, and is 80 feet long, 60 feet wide, and 53 feet high; on each side is a range of six columns, similar to those in the portico. On the north side are the several receiving rooms for newspapers, inland and ship-letters, and behind these are rooms for inland letter-

sorters and carriers; the mails are received at the east end, which also contains the West Indies, comptroller's, and mail coach offices, with the twopenny post office and their requisite apartments; on the south side are the foreign receiver general's and accountants' offices.

Plate CIV.—Custom House, London.—This edifice was commenced and carried into execution from the designs and under the superintendence of David Laing, Esq., but in consequence of some unfortunate failings in the foundations of the centre of the building, that portion of it was taken down and rebuilt under the direction of Sir Robert Smirke. It is of the Ionic order, is 495 feet in length, by 108 feet in depth, and affords accommodation for about 650 officers and clerks. The long room in this building is considered a principal feature, and is appropriated for the transaction of public business: it is 186 feet long, and 60 feet wide. In the front next the river are an embankment and broad wharf, with a stone curvilinear wall, built on close sheet piling, ranging out of the perpendicular, continuous with the facing of the quay wall, with a flight of steps at each end provided for the public.

Plate CV.—Interior of Norwich Cathedral.—A most beautiful specimen of the architecture of the middle ages, and is considered, in consequence of its fine proportions, and judicious application of its parts, to vie with any erection of a similar style in the kingdom.

Plate CVI.—Plan and Elevation of Fishmongers' Hall.—This hall has been recently erected from the design and under the superintendence of Henry Roberts, Esq. It is situate on the city side, and immediately at the termination of London bridge, and is of the Ionic order. The engraving exhibits the plan of the principal floor, the eastern or entrance front from King William Street, and the south or river elevation. The extent of the entrance front is 160 feet, that of the river nearly 100 feet. The basement is rusticated, and has a cornice and blockings to correspond with that of London bridge, to which it is in some measure contiguous. The river front from the basement to the principal floor, and embracing that portion of the centre occupied by three-quarter columns, is an arcade projecting on the wharf towards the river, which is shown on the elevation, but not on the principal plan. The various dimensions of the principal rooms are figured on the plan, and the method of panelling the ceilings is indicated by the dotted lines. The proportions of the elevations will be sufficiently developed by applying to the scale.

Plate CVII.—River Front of Somerset House.—This edifice was designed and carried into execution by Sir William Chambers for various public offices. It at present finds accommodation for various societies, and until this year the annual exhibition of the works of British painters, architects and sculptors, took place in the apartments which belong to the Royal Academy. The building occupies a space of about 800 feet in width, and 500 feet in depth.

Plate CVIII.—New Method of Constructing Wharf Walls without the aid of Cofferdams.—This method, which was invented by Robert Sibley, Esq., has been adopted with admirable success at the island lead works, Limehouse, at London bridge, &c. It will be perceived by referring to the drawings, that cast iron piles are placed about 10 feet asunder, and when these are driven, and any impediment or irregularity presents itself, it is removed or corrected by using an auger or jumper within the pile. The piles are cast with grooves to receive the panels or plates; consequently when the piles are driven, the principal labour is done. Wrought iron ties are fixed with rings externally and permanently to some contiguous building or block of stone (for mooring vessels to, &c.) and the whole is backed in with concrete of a proportionate thickness to the soil or depths, which becomes a solid mass. When these piles were first used, holes were bored for placing the piles and to guide them in driving, but in the second and third works at London bridge, the piles were driven without boring, and the bed of the river was dredged for putting down the plates; they have also two tiers of iron ties. It is necessary to fill the iron piles with concrete to prevent mischief from freezing, &c.; the dimensions of the piles, plates, &c., are shown in the drawings. The great advantages derived from the new method of construction are from the facility of execution, economy and durability, the expenses not exceeding the cost of a cofferdam. It should be observed that the removal of cofferdams has frequently caused serious settlements in the works built within them, particularly the new wall at Sheerness, and the piers of the new London bridge, &c.

GLOSSARY OF TECHNICAL TERMS.

Aaron's Rod; an ornamental figure, representing a rod with a serpent twined about it, and called by some, though improperly, the *Caduceus* of Mercury.

Abacus; the upper member of a capital of a column, serving as a kind of crown piece in the Grecian Doric, and a collection of members or mouldings in the other Orders.

Acanthus; a plant, the English *Bear's Breech*, the leaves of which are represented in the capital of the Corinthian Order, &c. *Acanthine* means ornamented with leaves of the acanthus.

Acropolis; from the Greek: the highest part of a city, the citadel or fortress.

Acroterium; (plural, *Acroteria*) the extremity or vertex of any thing; a pedestal or base placed on the angle, or on the apex of a pediment, which may be for the support of a vase or statue.

Ægis; in decoration, a shield or breastplate, particularly that of Minerva.

Ægricanés; sculptures representing the heads and sculls of rams; commonly used as a decoration of ancient altars, friezes, &c.

Æneatorés; sculptures representing military musicians.

Ætoma; a pediment, or the *tympanum* of a pediment.

Aile or *Aisle;* a walk in a church, on the sides of the *nave;* the wings of a choir.

Alcove; a recess or part of a chamber, separated by an *estrade*, or partition of columns.

Aræostyle; the greatest interval or distance that can be made between columns.

Alto-relievo or *High-relief;* that kind or portion of sculpture which projects so much from the surface to which it is attached, as to appear nearly insulated. It is therefore used in comparison with *Mezzo-relievo*, or Mean-relief, and in opposition to *Basso-relievo*, or Low-relief.

Amphitheatre; a spacious edifice, of a circular or oval form, in which the combats and shows of antiquity were exhibited.

Amphora (plural, *Amphoræ*); a vase or earthen jar, with two handles. Hence, in decoration, *Amphoral* means shaped ike an amphora or vase.

Ancon; in decoration, a curved drinking cup or horn.

Anconés; ornaments depending from the corona of Ionic door-ways, &c.

Angels; brackets or corbels, with the figures or heads of angels.

Angular Capital; the modern Ionic or *Scammozian* capital, which is formed alike on all the four faces, so as to return at the angles of the building.

Annulet or *Fillet;* a small square member in the Doric capital, under the quarter-round.

Antæ; a species of pilasters common in the Grecian temples, but differing from pilasters, in general, both in their capitals and situation.

Arcade; an aperture in a wall, with an arched head: it also signifies a range of apertures with arched heads.

Arc-boutants, or *Boutants;* arch-formed props, in Gothic churches, &c. for sustaining the vaults of the nave; their lower ends resting on the pilastered buttresses of the aisles, and their upper ends resisting the pressure of the middle vault, against the several springing points of the groins. They are, at times, called *flying-buttresses, arched buttresses,* and *arch-butments.*

Arch; arches are either circular, elliptical, or *straight:* the last being so termed, but improperly, by workmen. The terms *arch* and *vault* properly differ only in this, that the arch expresses a narrower, and the vault a broader, piece of the same kind.

Architectonic; something endowed with the power and skill of building, or calculated to assist the architect.

Architecture; the art or science of erecting edifices, either for habitation or defence.

Architrave; a beam; that part of an entablature which lies immediately upon the capital or head of the columns.

Bagnio; the Italian name for a bath, or bathing-house; answering to the Greek *Balaneia*, and the Latin *Balneum.*

Balcony; an open gallery, projecting from the front of a building, and commonly constructed of iron or wood.

Baluster; a small column or pillar, belonging to a *Balustrade.*

Balustrade; a range of *Balusters*, supporting a cornice, and used as a parapet or screen, for concealing a roof, &c.

Bande; a narrow flat surface, having its face in a vertical plane.

Banded Column; a column encircled with *Bands*, or annular *rustics.*

Bay-Window; a window projecting from the front, in two or more planes, and not forming the segment of a circle.

Belfry, anciently the *campanile;* the part of a steeple in which the bells are hung.

Belvedere; a turret, lookout, or observatory, commanding a fine prospect, and generally very ornamental.

Bosse or *Boss,* in sculpture; relief or prominence: hence *Bossage*, the projection of stones laid rough, to be afterwards carved into mouldings, capitals, or other ornaments.

Boulder-Walls; those constructed of flints or pebbles, laid in strong mortar.

Buttresses, flying, &c. See *Arc-boutants.*

Caduceus, an emblem or attribute of Mercury; a rod entwined by two-winged serpents.

Camber; an arch on the top of an aperture, or on the top of a beam: whence *Camber-windows*, &c.

Campana; the body of the Corinthian capital.

Campanæ, or *Campanula,* or *Guttæ;* the drops of the Doric architrave.

Caryatidæ, or *Caryatides;* so called from the Caryatides, a people of Caria; an order of columns or pilasters, under the figures of women dressed in long robes, after the manner of the Carian people, and serving to support an entablature. This order is styled the *Caryatic.*

Castellated; built in imitation of an ancient castle.

Catacomb; a subterraneous place for the interment of the dead.

Chain-timber, in brick building; a timber of large dimensions placed in the middle of the height of a story, for imparting strength.

Chancel; the communion-place of a Christian church.

Chantry; a small chapel, on the side of a church, &c.

Cloacæ; the Roman name for sewers, drains, and sinks, conveying filth from the city into the river.

Coffer-dam; a hollow space, formed by a double range of piles, with clay rammed in between.

Coin or *Quoin;* a corner or angle made by the two surfaces of a stone or brick building.

Colonnade; a range of columns, whether attached or insulated, and supporting an entablature.

Conservatory; a superior kind of green-house, for valuable plants, &c.

Console; a bracket or projecting body, shaped like a curve of contrary flexure, scrolled at the ends, and serving to support a cornice, bust, or other ornament.

Corbeils; carved work, representing baskets filled with fruit or flowers, and used as a finish to some elegant part of a building.

Corbels; a horizontal row of stones or timber, fixed in a wall or on the side of a vault, for sustaining the timbers of a floor or of a roof.

Cornice; a crowning; any moulded projection which crowns or finishes the part to which it is attached.

Cornucopia; the horn of plenty; represented in sculpture under the figure of a large horn, out of which issue fruits, flowers, grain, &c.

Corona, Larimer, or *Drip.*

Corridor; a long gallery or passage around a building, and leading to the several apartments.

Cove; any kind of concave moulding; also the concavity of a vault. Hence, a *coved and flat ceiling* is a ceiling of which the section is a portion of a circle, springing from the walls, and rising to a flat surface.

Crockets; in the pointed style of architecture, the small ornaments placed equidistantly along the angles of pediments, pinnacles, &c.

Crosettes, in decoration; the trusses or consoles on the flanks of the architrave, under the cornice.

Cross-springers; in groins of the pointed style, the ribs that spring from one diagonal pier to the other.

Crown; the uppermost member of a cornice, including the corona, &c.

Crypt; an antient name for the lowest part or apartment of a building.

Cupola; a dome, arched roof, or turret.

Cusps; the pendents of a pointed arch, &c., two of which form a trefoil, three a quadrefoil, four a cinquefoil, &c.

Cymatium, or *cyma,* or summit of a cornice.

Dado, the Die, or that part of the middle of the pedestal of a column between its base and cornice.

Demi, or *Semi,* or *Hemi,* signifies one-half. Hence semi-circle, hemi-sphere, &c.

Demi-relievo, in carving or sculpture, denotes that the figure rises one-half from the plane.

Dentils; ornaments in a cornice.

Diglyph; a tablet with two engravings or channels.

Ditriglyph; having two triglyphs over an intercolumn.

Domes; spherical roofs.

Dormer or *Dormant Window,* windows made in the roof.

Drops; in ornamental architecture, small pendent cylinders, or frustums of cones attached to a surface vertically, with the upper ends touching a horizontal surface, as in the cornice of the Doric order.

Drum or *Vase,* of the Corinthian and Composite capitals; the solid part to which the foliage and stalks, or ornaments, are attached.

Eaves; the margin of a roof, overhanging the walls.

Echinus or *ovolo,* Roman.

Embattled; a building with a parapet, having embrasures, and therefore resembling a battery or castle.

Embossing; forming work in relievo, whether cast, moulded, or cut with a chisel. See *Alto* and *Demi-relievo.*

Entablature; the ornament supported by the capital of a column or pilaster.

Epistylium, or architrave of the entablature.

Façade; the face or front of a building.

Flying Buttresses. See *Arc Boutant*.

Fret; a species of ornament, commonly composed of straight grooves or channelures at right-angles to each other. The *labyrinth fret* has many turnings or angles, but in all cases the parts are parallel and perpendicular to each other.

Frieze, or *Frize*, or *Zophorus*; in the entablature of columns, separating the architrave and cornice.

Gable; the triangular part of the wall of a house or building, immediately under the roof.

Granite. See Materials, in *Masonry*.

Groined Ceiling; a cradling constructed of ribs, lathed and plastered.

Groins and *Arches*. See *Carpentry* and *Masonry*.

Grotesque; the light, gay, and beautiful style of ornament, practised by the ancient Romans in the decoration of their palaces, baths, villas, &c.

Hall; a word commonly denoting a mansion or large public building, as well as the large room at the entrance. Hence *Guildhall*, *Town-Hall*, &c.

Helix; scrolls in the Corinthian capital, also called *Urillæ*.

Hem; the projecting and spiral parts of the Ionic capital.

Hexastyle; a building with six columns in front.

Impost; a term used to express a fascia.

Intaglios; the carved work of an order or any part of an edifice, on which heads or other ornaments may be sculptured.

Intercolumn; the open area or space between two columns.

Keep; in a castle, the middle or principal tower.

Labyrinth; an intricate building; a *Labyrinth-fret*, a fret with many turnings, which was a favourite ornament of the ancients. See *Fret*.

Lacunariæ, or *Lacunars*; panels or coffers formed on the ceilings of apartments, and sometimes on the soffits of coronæ in the Ionic, Corinthian, and Composite, orders.

Lantern; a turret raised above the roof, with windows round the sides, constructed for lighting an apartment beneath.

Lobby; a small hall or waiting-room, or the entrance into a principal apartment.

Lunette; an aperture in a cylindric, cylindroidic, or spherical ceiling; the head of the aperture being also cylindric or cylindroidic.

Luthern; a kind of window, over the cornice, in the roof of a building, for the purpose of illuminating the upper story. They are denominated according to their forms, as square, semi-circular, bull's eyes, &c.

Meros; the middle part of a trigliph.

Metope; in the Doric frieze, the square piece or interval between the trigliphs, or between one trigliph and another. The metopes are sometimes left naked, but are more commonly adorned with sculpture. When there is less space than the common metope, which is square, as at the corner of the frieze, it is called a *semi* or *demi-metope*.

Mezzo-relievo, or *Demi-relievo*; sculpture in half relief.

Minnaret; a Turkish steeple, with a balcony.

Monopteron, or *Monoptral Temple*; an edifice consisting of a circular colonnade, supporting a dome, without any inclosing wall.

Monotrigliph; having only one trigliph between two adjoining columns: the general practice in the Grecian Doric.

Mosaic Work; an assemblage or combination of small pieces of marble, glass, stones, &c., of various colours and forms, cemented on a ground so as to imitate paintings.

Nave; the body of a church, reaching from the choir or chancel to the principal door.

Nebule; a zigzag ornament, but without angles, frequently found in the remains of Saxon architecture.

Neck of a capital; the space between the channelures and the annulets of the Grecian Doric capital. In the Roman Doric, the space between the astragal and annulet.

Niche; from an Italian word, signifying a *shell*; a hollow formed in a wall, for receiving a statue, &c.

Obelisk; a quadrangular pyramid, high and slender, raised as a monument or ornament, and commonly charged with inscriptions, &c.

Oriel-window; a projecting angular window, commonly of a triagonal or pentagonal form, and divided by mullions and transoms into different bays and compartments.

Orthography; an elevation, showing all the parts of a building in true proportion.

Pagoda or *Pagod*; an Indian temple, common in Hindoostan and the countries to the east.

Pantheon; a temple of a circular form, originally pagan.

Parapet; a dwarf wall raised on a terrace or building.

Pedestal; a square body of stone or other material, raised to sustain a column, statue, &c.

Pediment; an ornament, properly of a low triangular figure, crowning the front of a building, and serving often also as a decoration over doors, windows, and niches.

Periptere; a building encompassed with columns, which form a kind of aisle all round it.

Peristyle; among the ancients, the converse of Periptere, a continued row of columns *within* the buildings; among the moderns, a range of columns, either within or without the same.

Piazza; a portico or covered walk, supported by arches.

Pier; a square pillar, without any regular base or capital.

Pilaster; a column let into the wall, showing one-fourth or one-fifth part of its thickness.

Piles; planks of which the ends are sharpened, so as to enter into the bottom of a canal, &c.

Pillar; a column of an irregular make; not formed according to rules, and deviating from the measures of regular columns. This is the distinction of the *pillar* from the *column*. A square pillar is commonly called a *pier*.

Plinth; the square piece under the mouldings in the bases of columns.

Pointed-arch; an arch so pointed at the top as to resemble the point of a lance.

Porch; the kind of vestibule at the entrance of temples, halls, churches, &c.

Portail; the face of a church, on the side in which the great door is formed; also the gate of a castle, palace, &c.

Portal; a little gate, where there are two of a different size.

Portico; a covered walk, porch, or piazza, supported by columns.

Priory; a religious house or institution, at the head of which is a prior or prioress.

Profile; the figure or draught of a building, &c.; also the general contour or outline.

Proscenium; in a theatre, the stage, or the front of it.

Prostyle; a range of columns in front of a temple.

Pyramid; a solid massive structure, which, from a square, triangular, or other, base, rises diminishing to a vertex or point.

Quoin; this term is applied to the stones at the corners of brick buildings. When these stand out beyond the brick-work, with edges chamfered, they are called *Rustic Quoins*.

Rampant arch; an arch, of which the abutments spring from an inclined plane.

Relievo, *Relief*, or *Embossment*. See *Alto-relievo*, &c.

Revels, pronounced *Reveals*; the vertical retreating surface of an aperture.

Rose; an ornament in the form of a rose, found chiefly in cornices, friezes, &c.

Rotondo or *Rotunda*; a common name for any circular building.

Rustic building; one constructed in the simplest manner, and apparently more agreeable to the face of nature than the rules of art.

Saloon; a spacious, lofty, and elegant hall or apartment, vaulted at top, and generally having two ranges of windows.

Sarcophagus; a tomb of stone, in general highly decorated, and used by the ancients to contain the dead bodies of distinguished personages.

Shaft of a chimney; the turret above the roof.

Shanks; the intersticial spaces between the channels of the trigliph, in the Doric frieze: sometimes called *Legs*.

Soffita or *Soffit*; any timber ceiling, formed of cross-beams of flying cornices, the square compartments or panels of which are enriched with sculpture or painting. *Soffit* also means the under side of an architrave, and that of the corona, or drip, &c.; also, the horizontal undersides of the heads of apertures, as of doors and windows.

Spherical and *Spheroidal Bracketing*; brackets formed to support lath and plaster, so that the outer surface shall be spherical, or spheroidal.

Sphinx; a favourite ornament in Egyptian architecture, representing the monster, half woman and half beast, said to have been born of Typhon and Echidna.

Striæ; the fillets or rays separating the furrows or grooves of fluted columns.

Striges; the channels of a fluted column.

Tænia, or *Tenia*; a small square fillet, at the top of the architrave, in the Doric capital.

Tambour; from a word signifying a drum, and meaning the naked of a Corinthian or Composite capital: also the wall of a circular temple, surrounded with columns.

Terrace; an elevated area for walking upon, and sometimes meaning a balcony.

Transept; the cross-ailes of a church of a cruciform structure.

Trophy; an ornament representing the trunk of a tree, supporting military weapons, colours, &c.

Vellar cupola; a cupola or dome, terminated by four or more walls.

Vermiculated Rustics; stones worked or tooled so as to appear as if eaten by worms.

Volute; the scroll or principal ornament of the Ionic capital.

Wainscot; the lining of walls; mostly panelled.

Water-table; a ledge in walls where the thickness begins to abate.

Weather-boarding; feather-edged boards, lapped and nailed upon each other, so as to prevent rain or drift from passing through.

Zophorus. See *Frieze*.

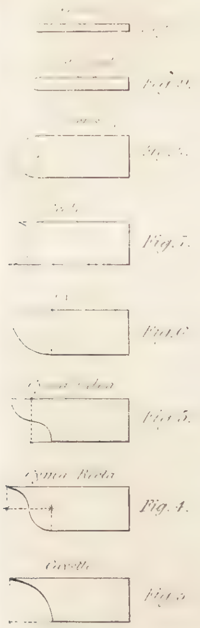
DIRECTIONS TO THE BINDER FOR PLACING THE PLATES.

As several Plates are described in the same page, we recommend placing the whole together at the end of the Volume; but when this is not adopted, the Plates may be placed opposite the pages, as below.

The Engraved Title-page to be placed in Vol. I. The Portrait of Mr. Peter Nicholson, to face the Engraved Title-page.

THEORY OF MOULDINGS, &c.

AND THE ANCIENT METHOD OF SWELLING THE SHAFTS OF COLUMNS.



A. *Plinth*	L *Fillet or upper Cincture*	W *Fillet or Tenia*
B *Lower Torus*	M *Astragal*	X *Triglyphs*
C *Fillet or Square*	N *Neck or Frise of yᵉ Capital*	Y *Capital of yᵉ Triglyph*
D *Scotia*	O *Fillets or Annulets*	Z *Ovolo or Quarter round*
E *Fillet*	P *Ovolo or Echinus*	1 *Mutule or Modillion Band*
F *Upper Torus*	Q *Abacus*	2 *Mutules*
G *Fillet or lower Cincture*	R *Inverted Cyma or Ogee*	3 *Ogee*
H *Conge*	S *Fillet*	4 *Corono or Drip*
I *Shaft of the Column*	T *Fascia of yᵉ Architrave*	5 *Ogee*
K *Conge*	U *Drops*	6 *Covello*
		7 *Fillet*

Profile of the Grecian Doric Entablature and Capital.

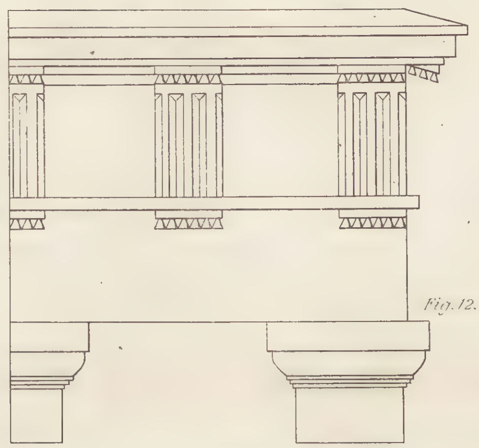


Fig. 12.

Roman Doric Order.

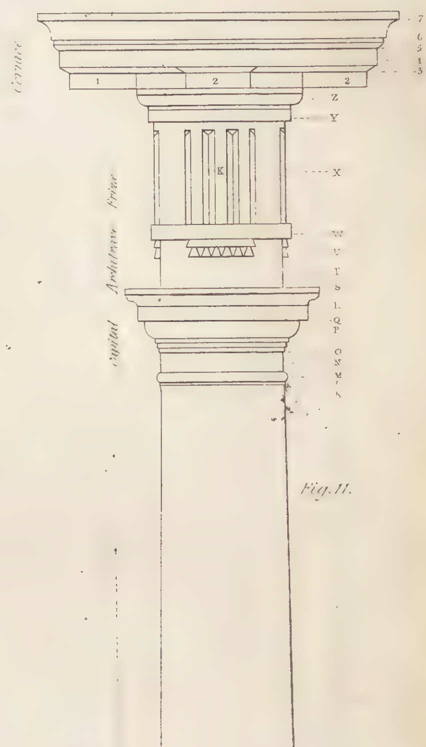
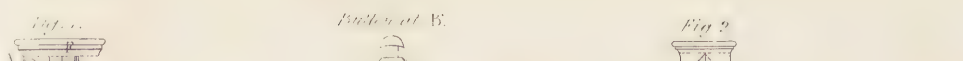
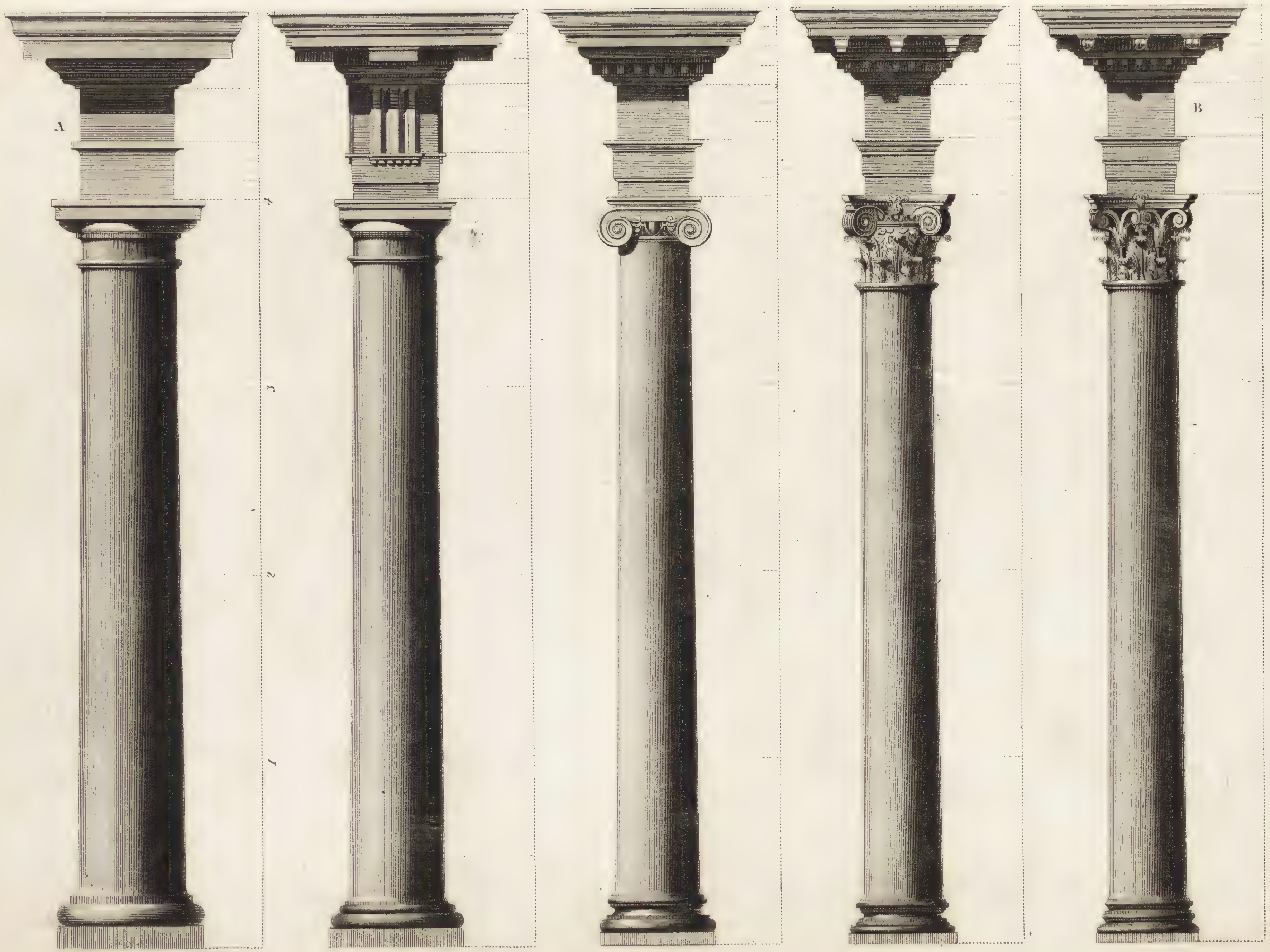


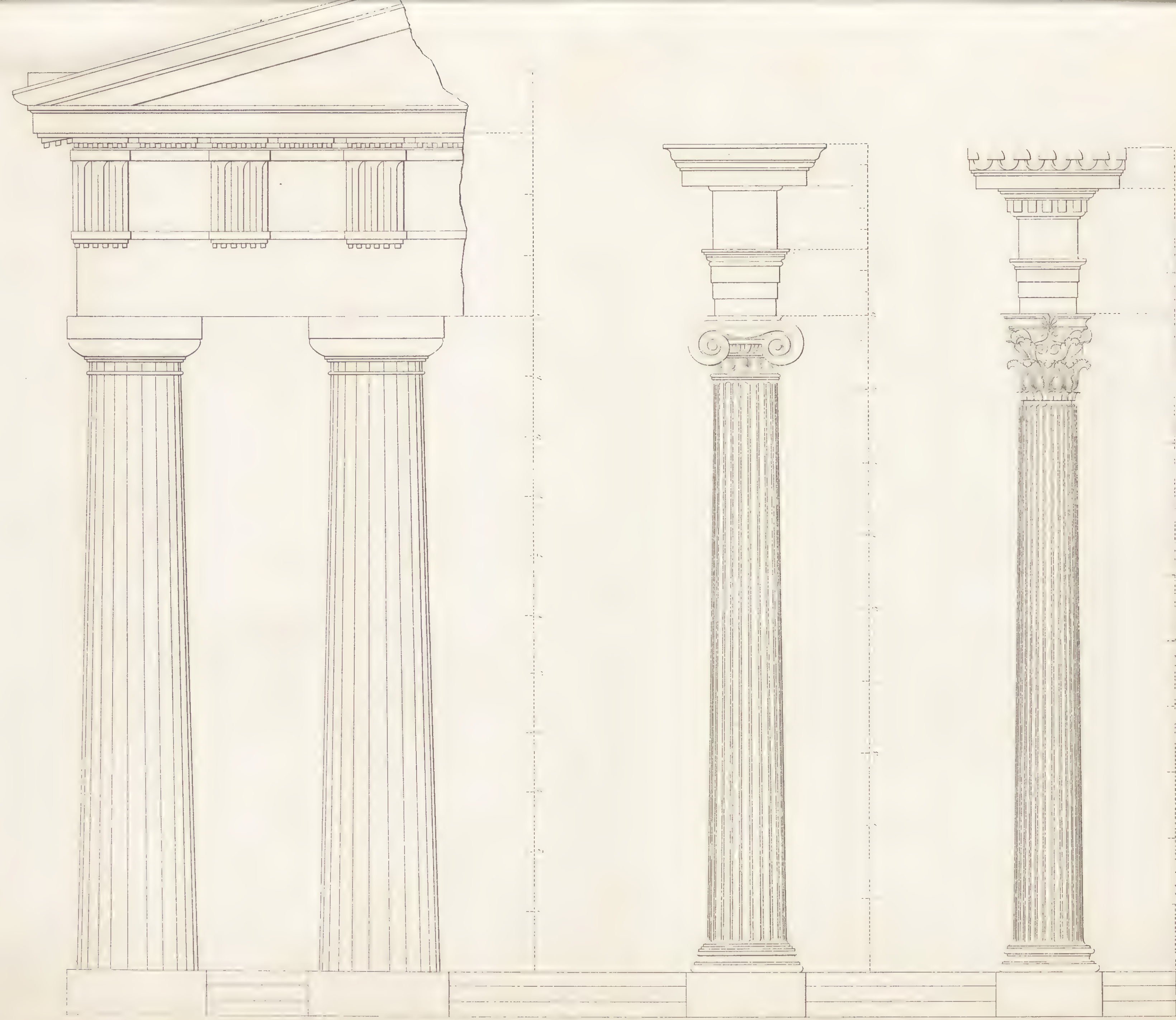
Fig. 11.





Tuscan Doric Ionic Composite Corinthian

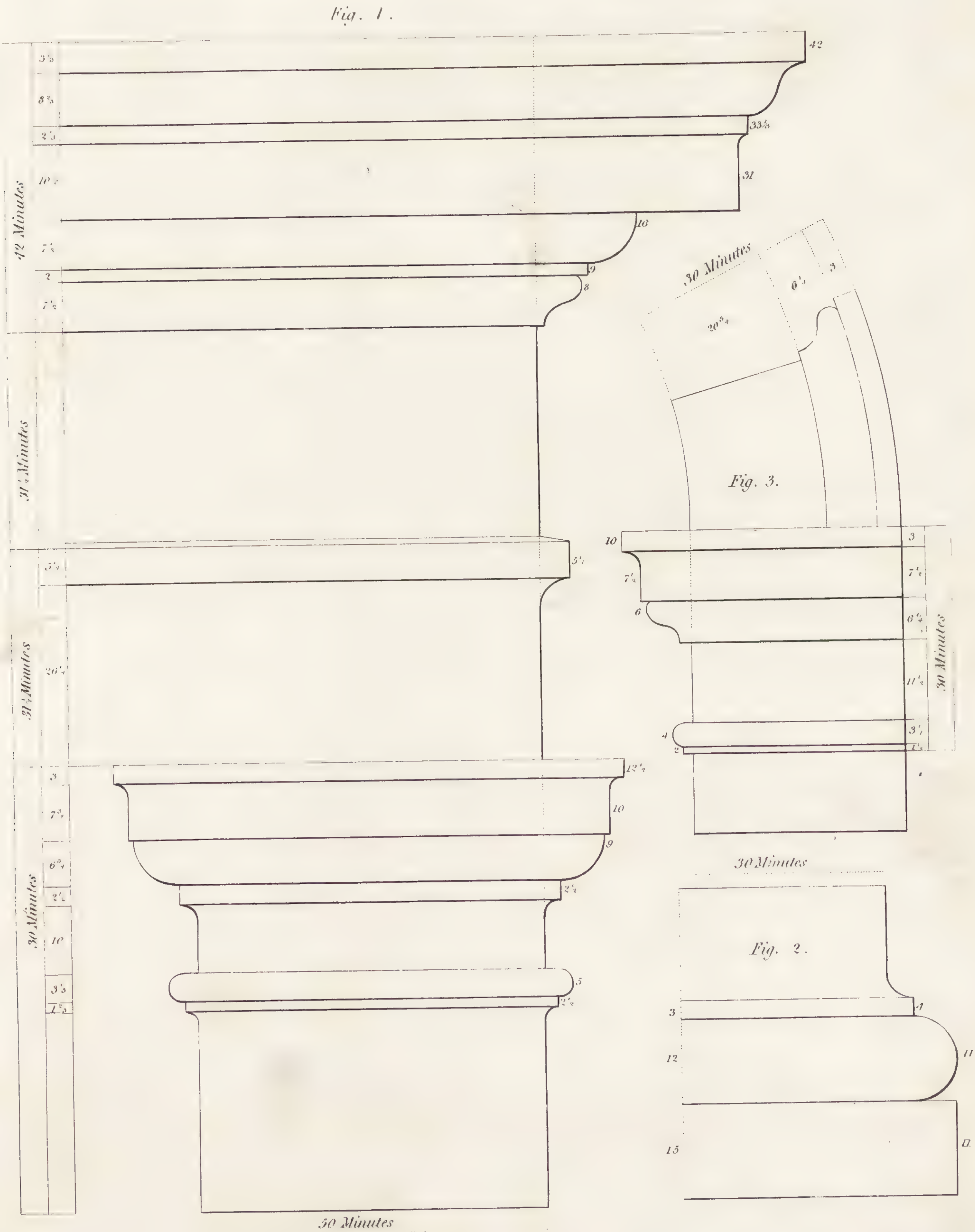
R. Elsam Archt. dirext. Sir Wm. Chambers Inv. R.D. Bolt. sculp.



Doric — Ionic — Corinthian

ondon, Published by Thos. Kelly, 17, Paternoster Row, April, 16 1848

PARTS OF THE TUSCAN ORDER.

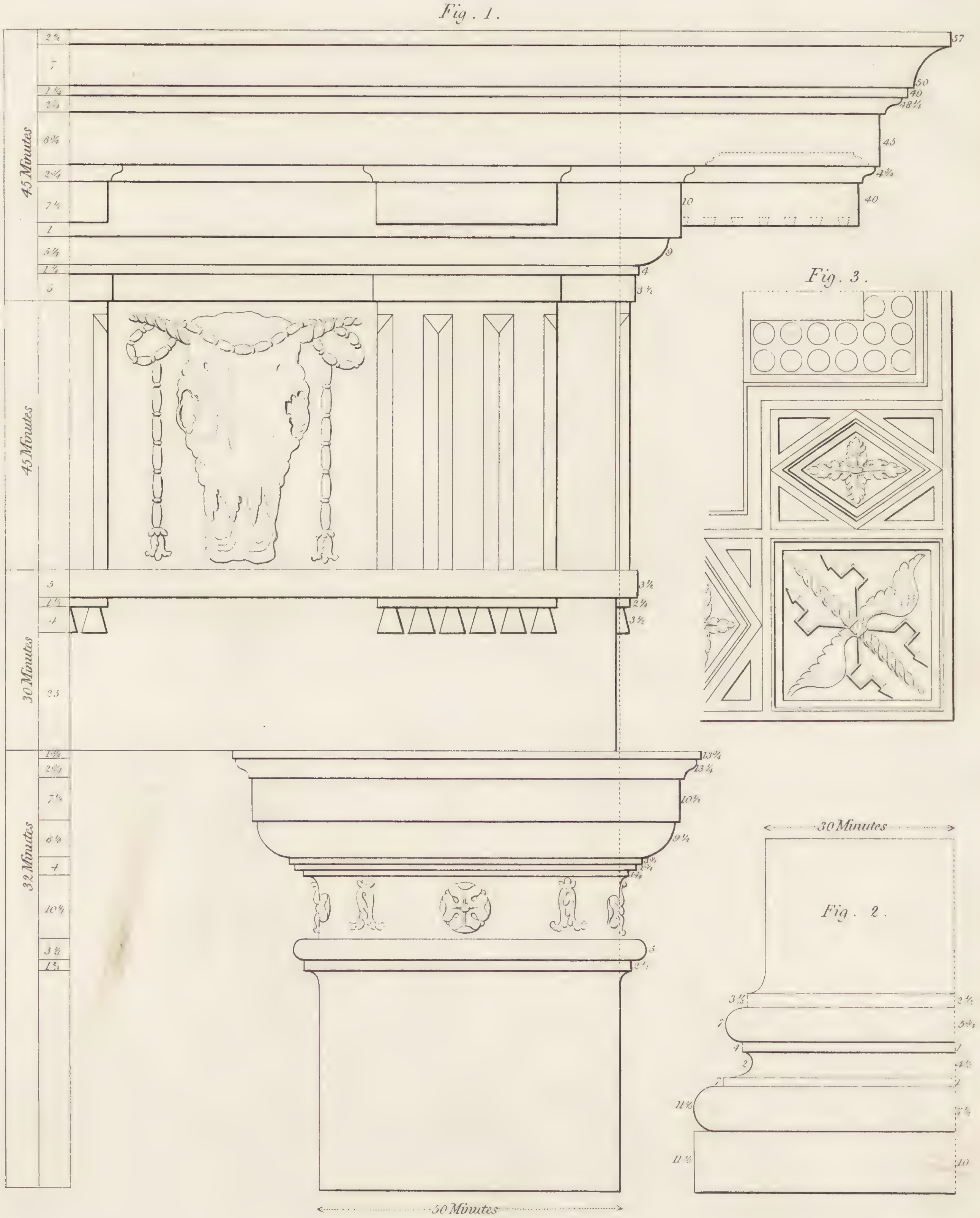


Drawn by M.A. Nicholson.

Engraved by W. Symns

London, Published by Thos Kelly 17 Paternoster Row, October 9, 1818

ROMAN DORIC ORDER.

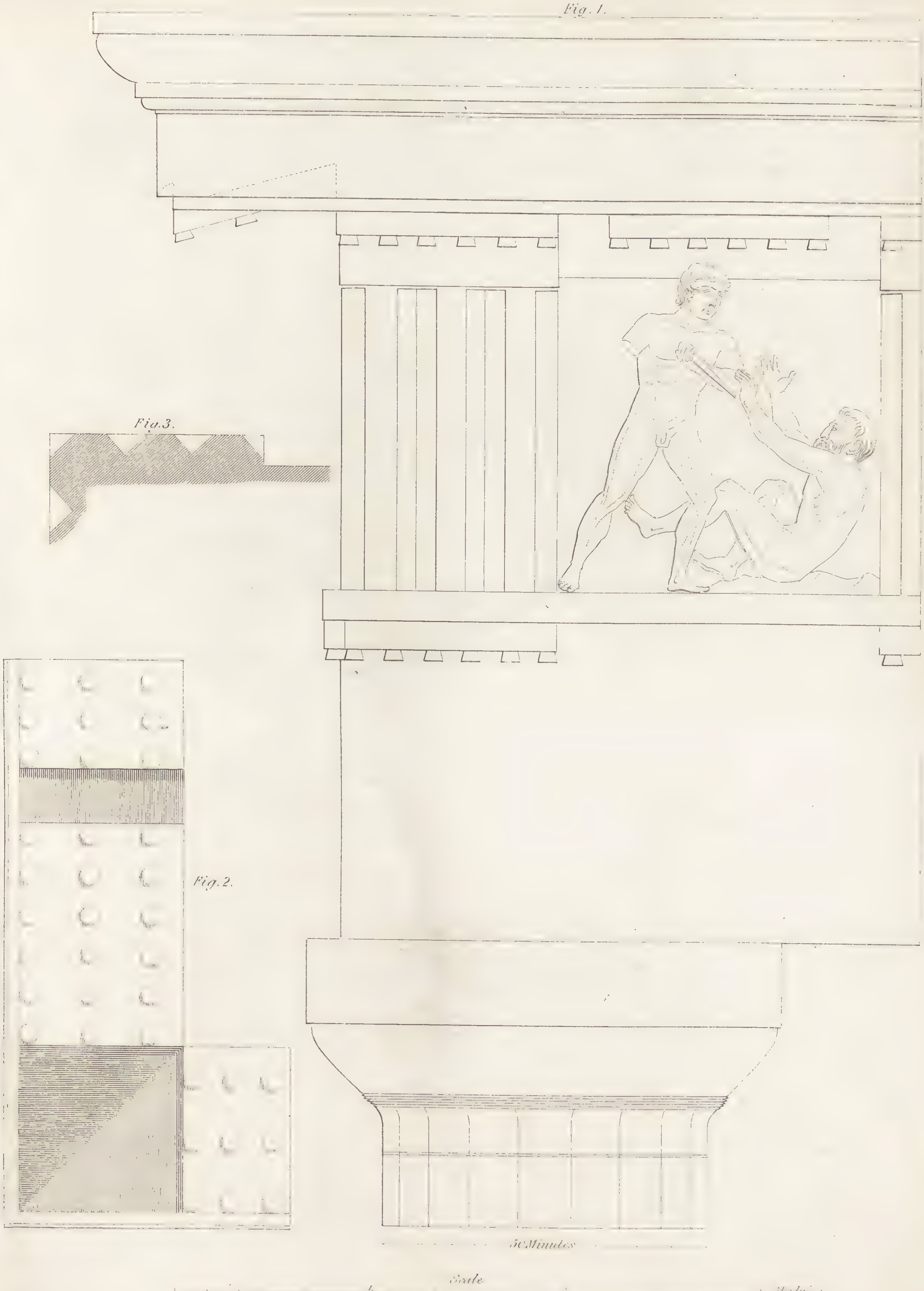


Drawn by M.A. Nicholson.

Engraved by W. Symns.

London, Published by Thos. Kelly, 17 Paternoster Row, January 1, 1848.

GRECIAN DORIC ENTABLATURE & CAPITAL OF A COLUMN.



Arch.t direx.t

Published ... Dec.r 2.d 1848

GRECIAN DORIC ORDER.

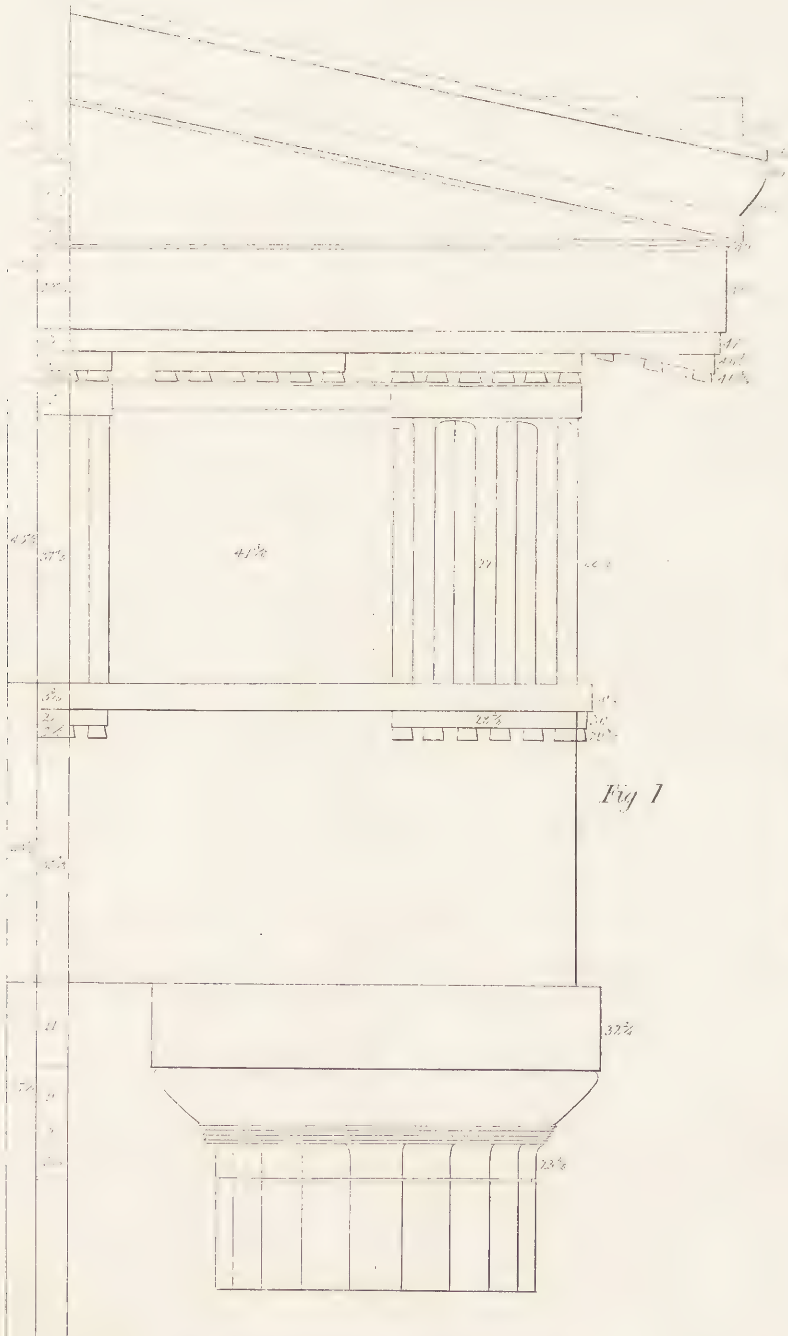


Fig 1

Fig 2.

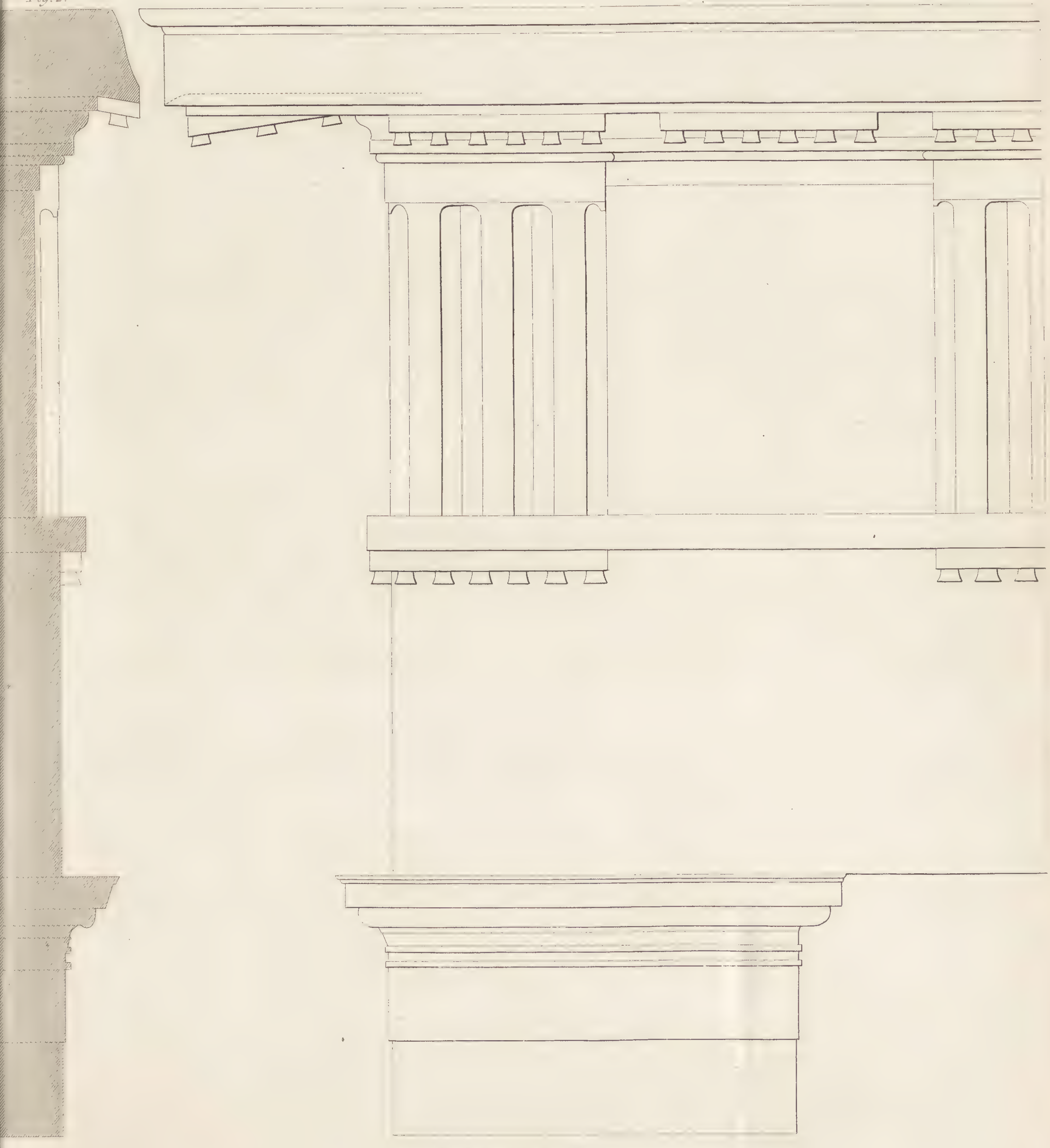
Drawn by M.A. Nicholson.

Engraved by W. [illegible]

London Published by Thos Kelly, 17 Paternoster Row, November 1 1848

GRECIAN DORIC ENTABLATURE AND ANTÆ.

Fig. 2. *Fig. 1.*



30 Minutes

Scale

5. 1. 2. 3 *Modules*

10 20 30 40 50 60 70 80 90 *Minutes*

R. Elsam, Archt. direxᵗ. — L. Adam

GRECIAN ENTABLATURE AND ANTÆ.

Fig. 1.

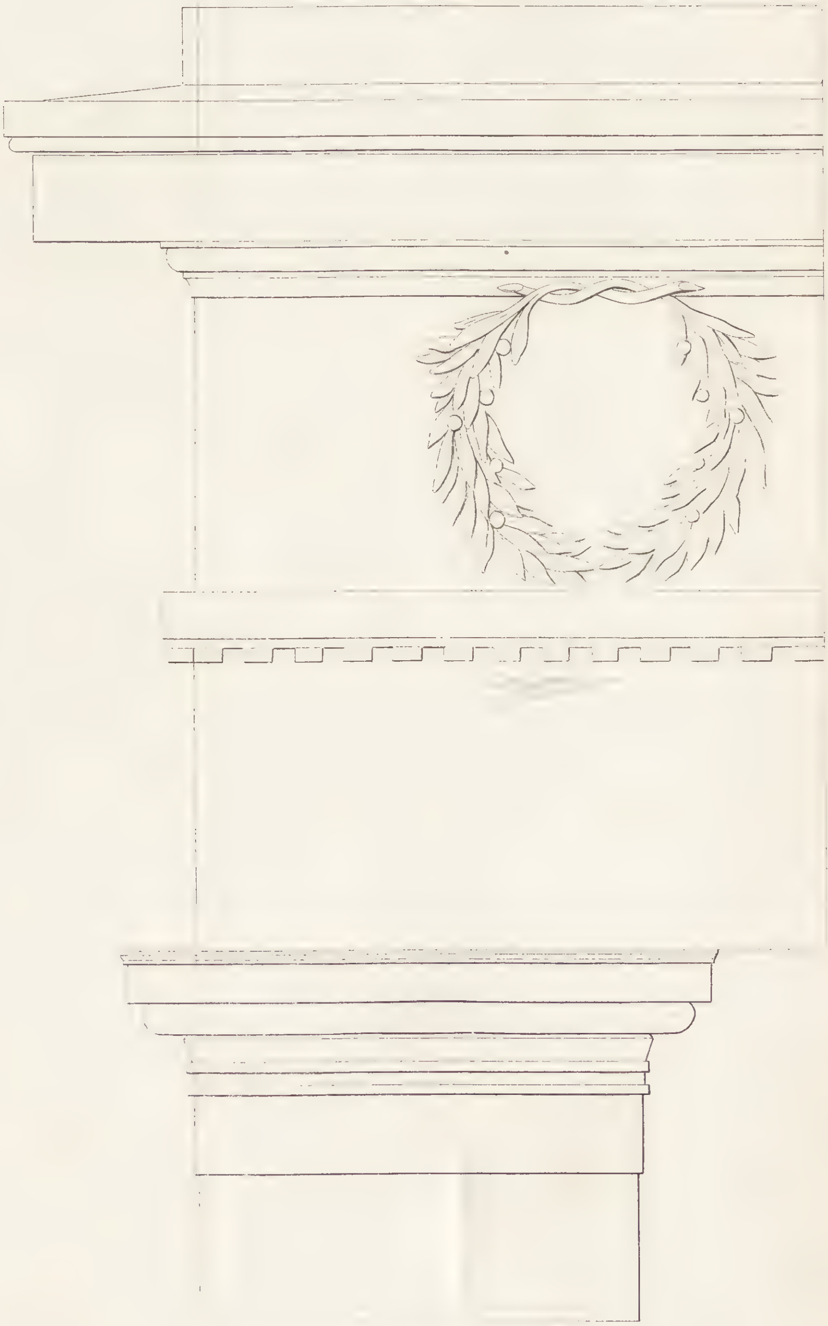
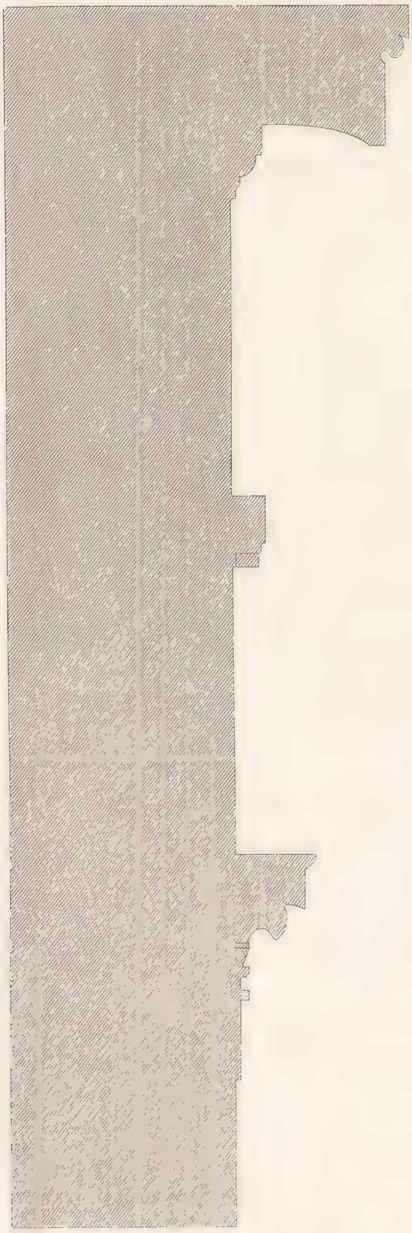


Fig. 2.



50 Minutes.

Scale

0 10 20 30 40 50 60 Minutes.

R. Elsam Archt. dirext.

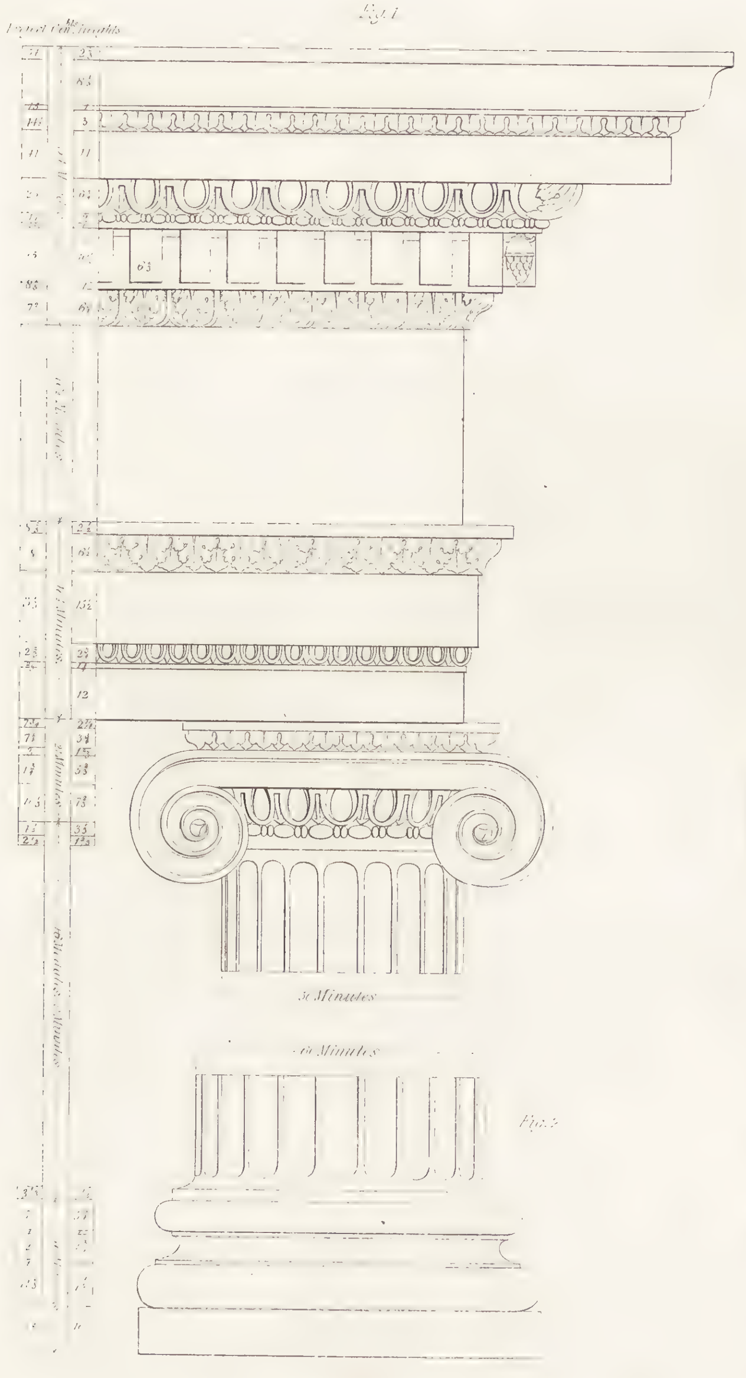
H. Adlard Sculp.

London, Published by Thos. Kelly, 11 Paternoster Row, Decr. 4 1848.

ROMAN IONIC ORDER.

ORDERS.
PLATE X.

Fig. 1.



Side of the Capital.

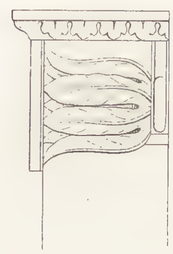


Fig. 3.

Profile of the Capital.

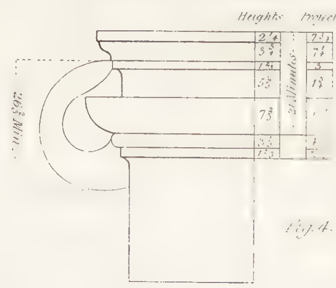
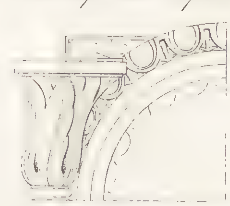


Fig. 4.

Plan of the Capital.

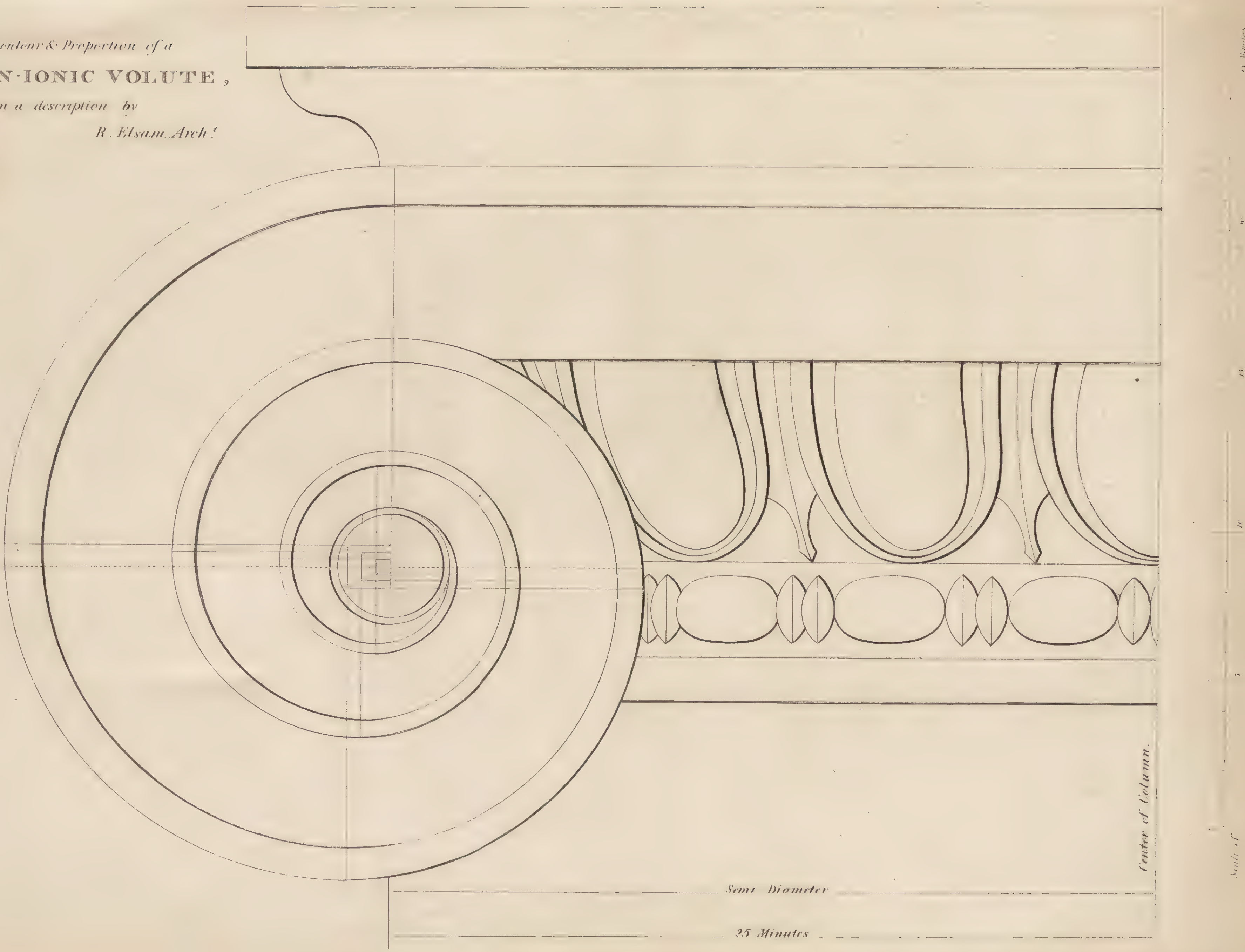


The Contour & Proportion of a

ROMAN-IONIC VOLUTE,

from a description by

R. Elsam. Arch.t

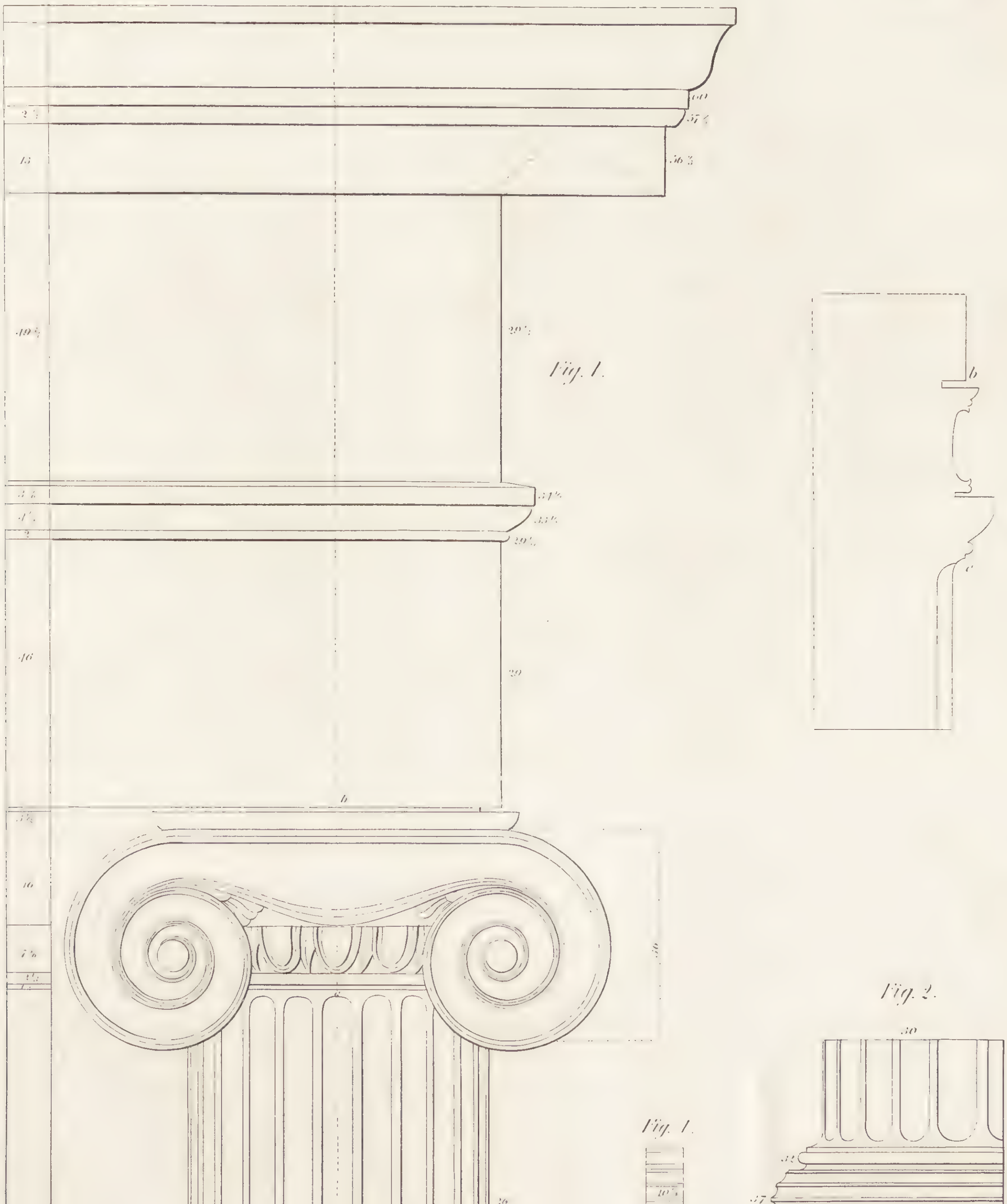


London Published by Tho.s Kelly, 17, Paternoster Row, Nov.r 6. 1836.

Engraved by W. Symns

IONIC ORDER.

FROM THE IONIC TEMPLE, ON THE ILISUS AT ATHENS.



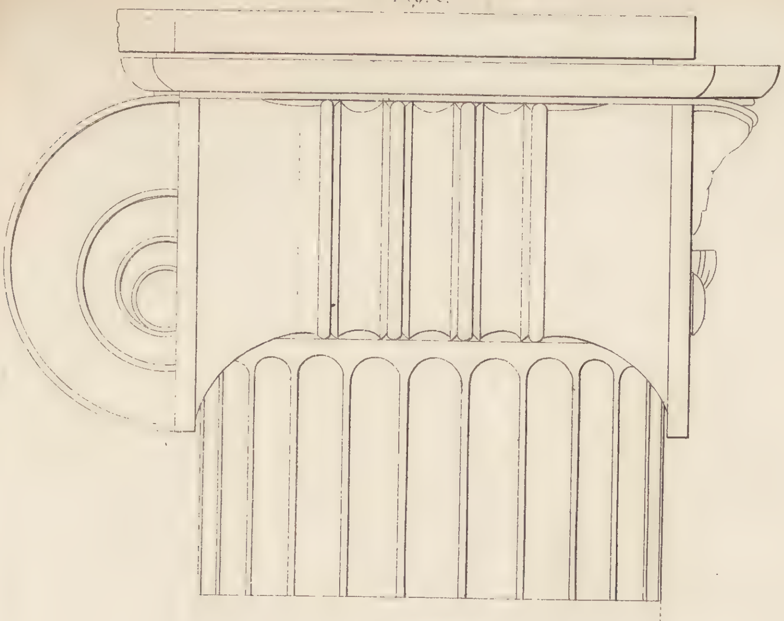
Drawn by M.A. Nicholson.

Engraved by

London Published by Tho. Kelly 17 Paternoster Row

GRECIAN IONIC CAPITAL.

Fig. 2.



50 Minutes.

Fig. 3.

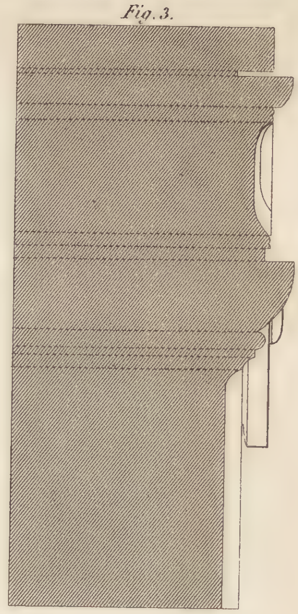


Fig. 1.

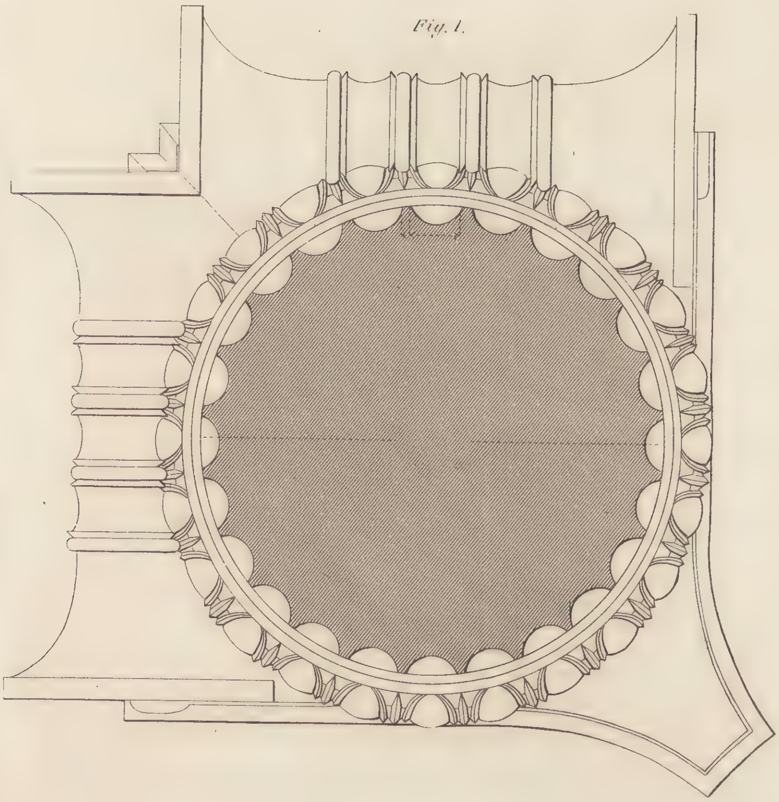
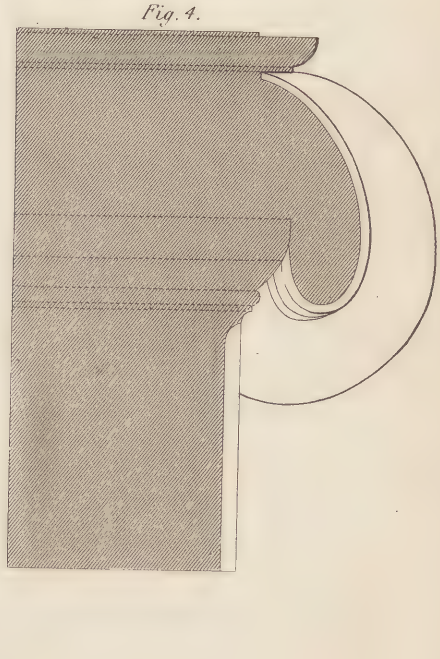


Fig. 4.



Scale

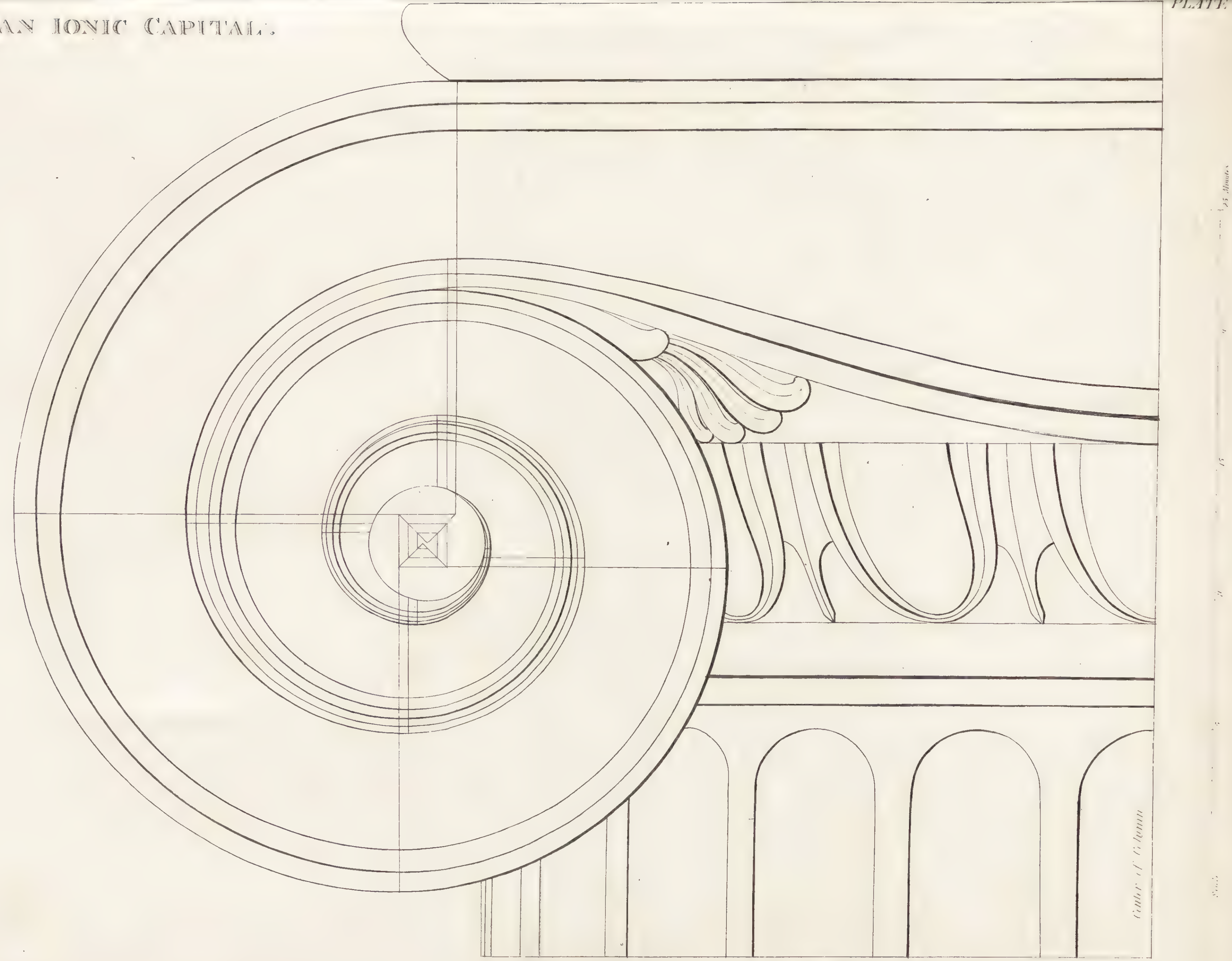
1 2 3. *Modules.*

0 10 20 30 40 50 60 70 80 90. *Minutes*

London, Published by Thos. Kelly, 17 Paternoster Row, Novr. 2, 1833.

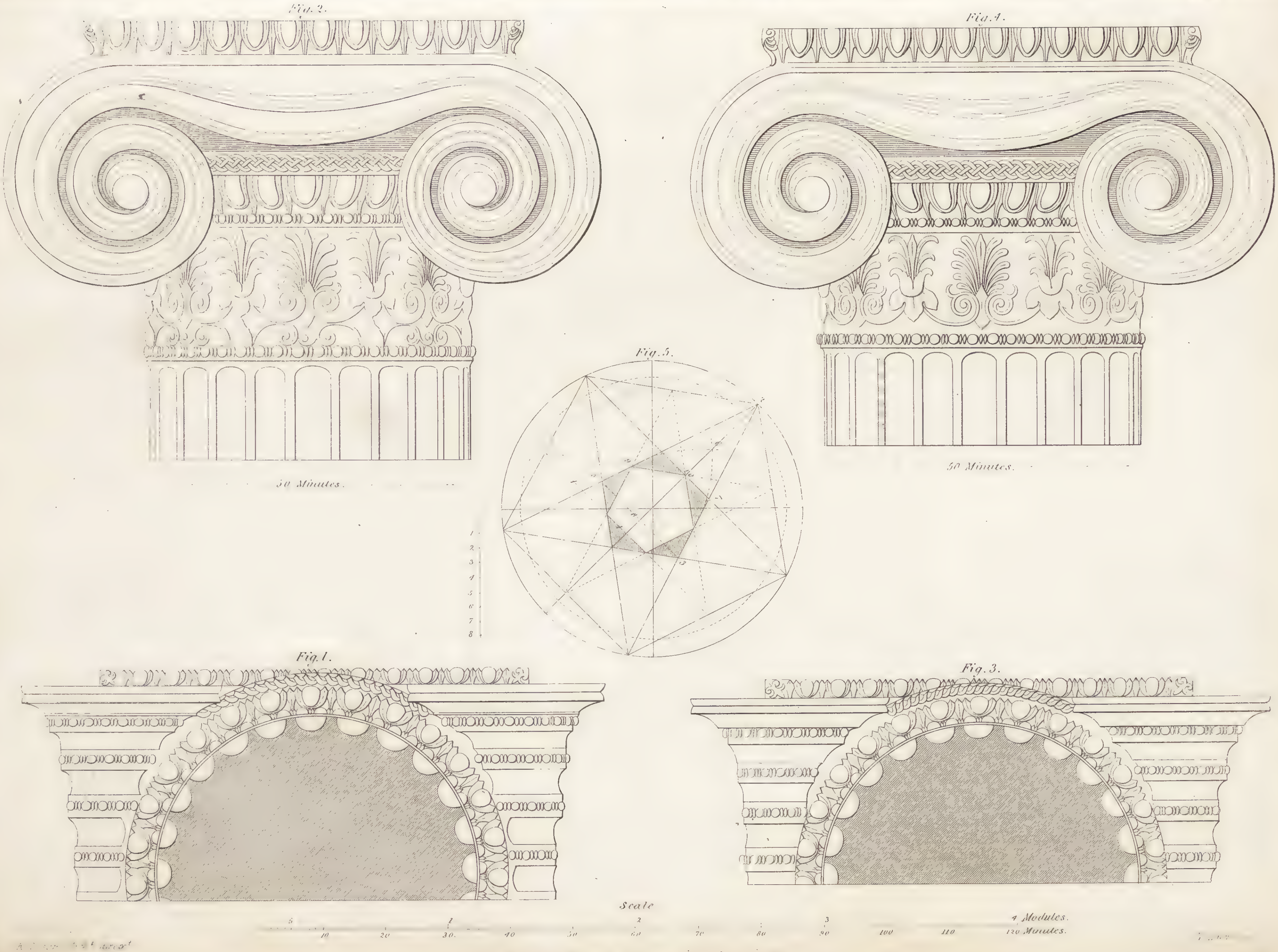
GRECIAN IONIC CAPITAL.

PLATE XIV



Engraved by E. Symns

London Published by Thos. Kelly 17 Paternoster Row Decr. 21.1843.



London Published by Thos Kelly 17, Paternoster Row Novr 20 1843.

ELEVATIONS & SECTIONS OF GRECIAN IONIC CAPITALS.

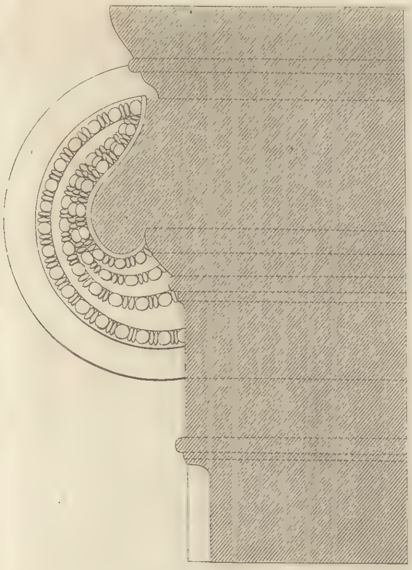


Fig. 2.

Fig. 1.

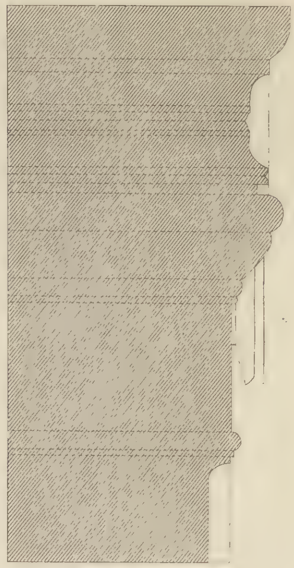


Fig. 3.

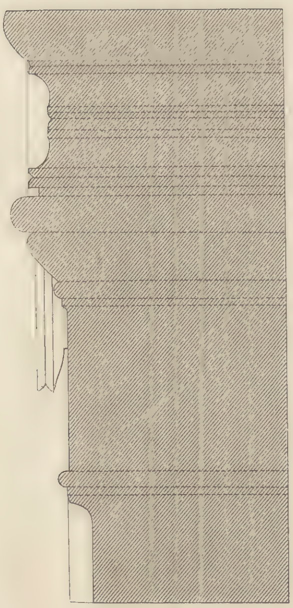


Fig. 4.

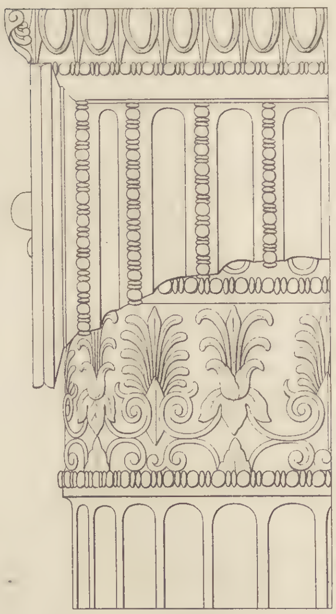


Fig. 5.

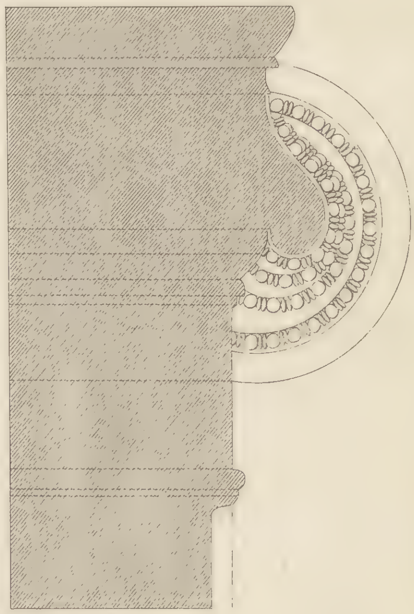
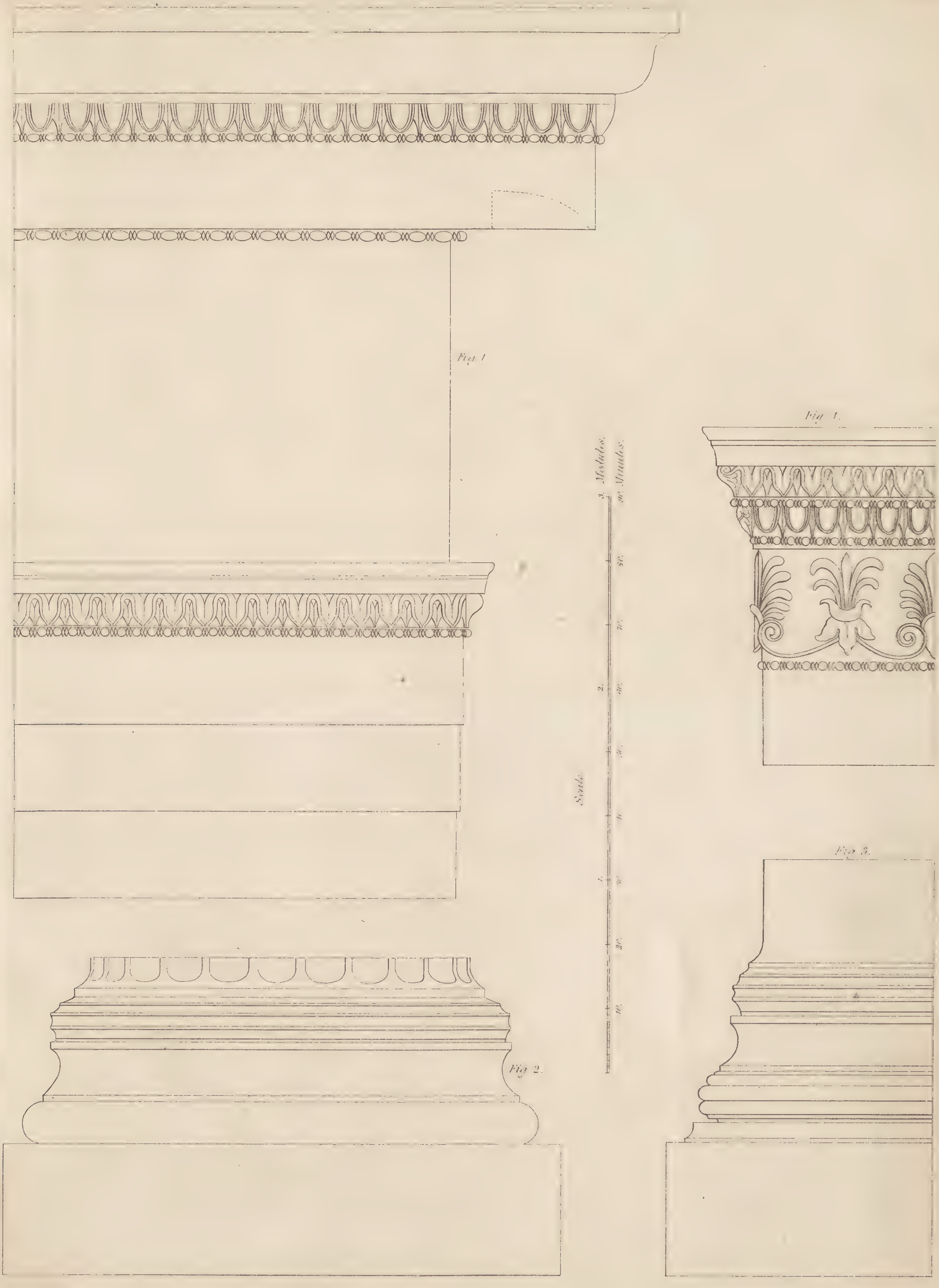


Fig. 6.

Elsam Arch^t delin^t

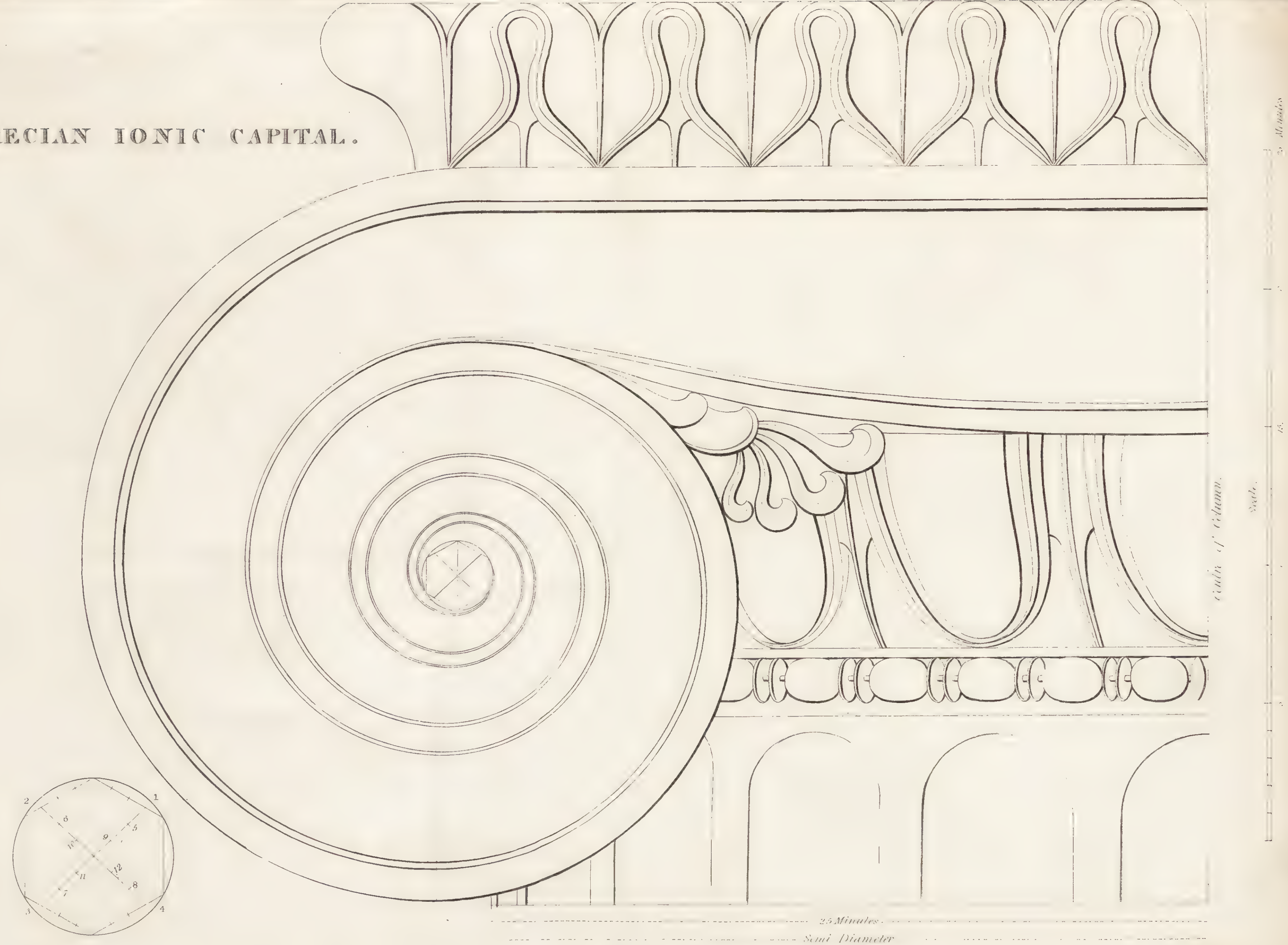
London. Published by Thos. Kelly, 17 Paternoster Row, Dec^r 11, 1848.

GRECIAN IONIC ENTABLATURE BASES AND ANTÆ.



London Published by Tho.s Kelly 17 Paternoster Row Jan.y 1 1836.
H. Adlard Sculp.

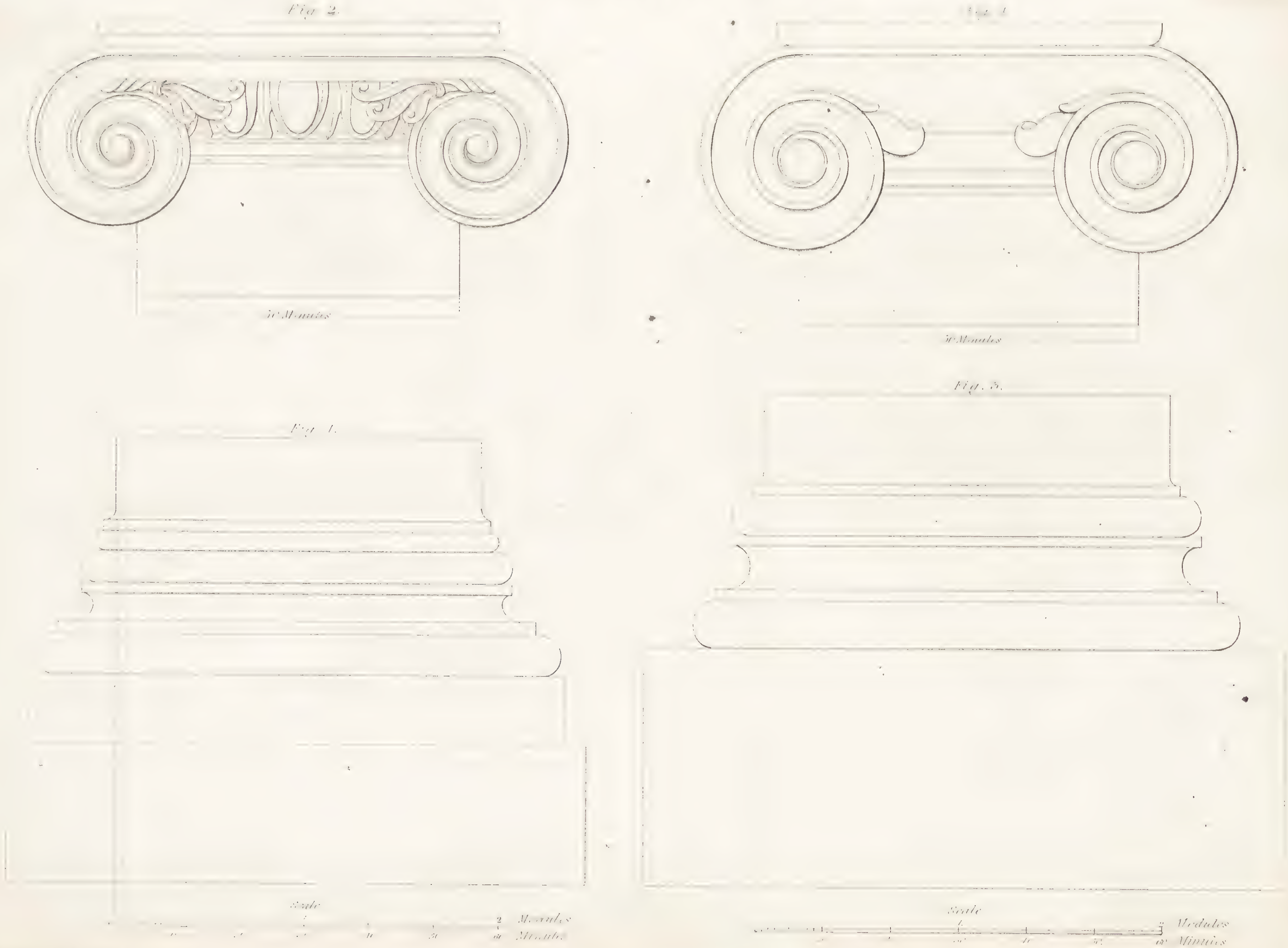
GRECIAN IONIC CAPITAL.



W. Symons Sculp.

London, Published by Thos. Kelly, 17 Paternoster Row, Feb. 5, 1848.

GRECIAN IONIC CAPITALS AND BASES.



London, Published by [illegible] 17 Paternoster Row, Jan. 29 1843

ROMAN COMPOSITE ORDER.

Fig. 1.

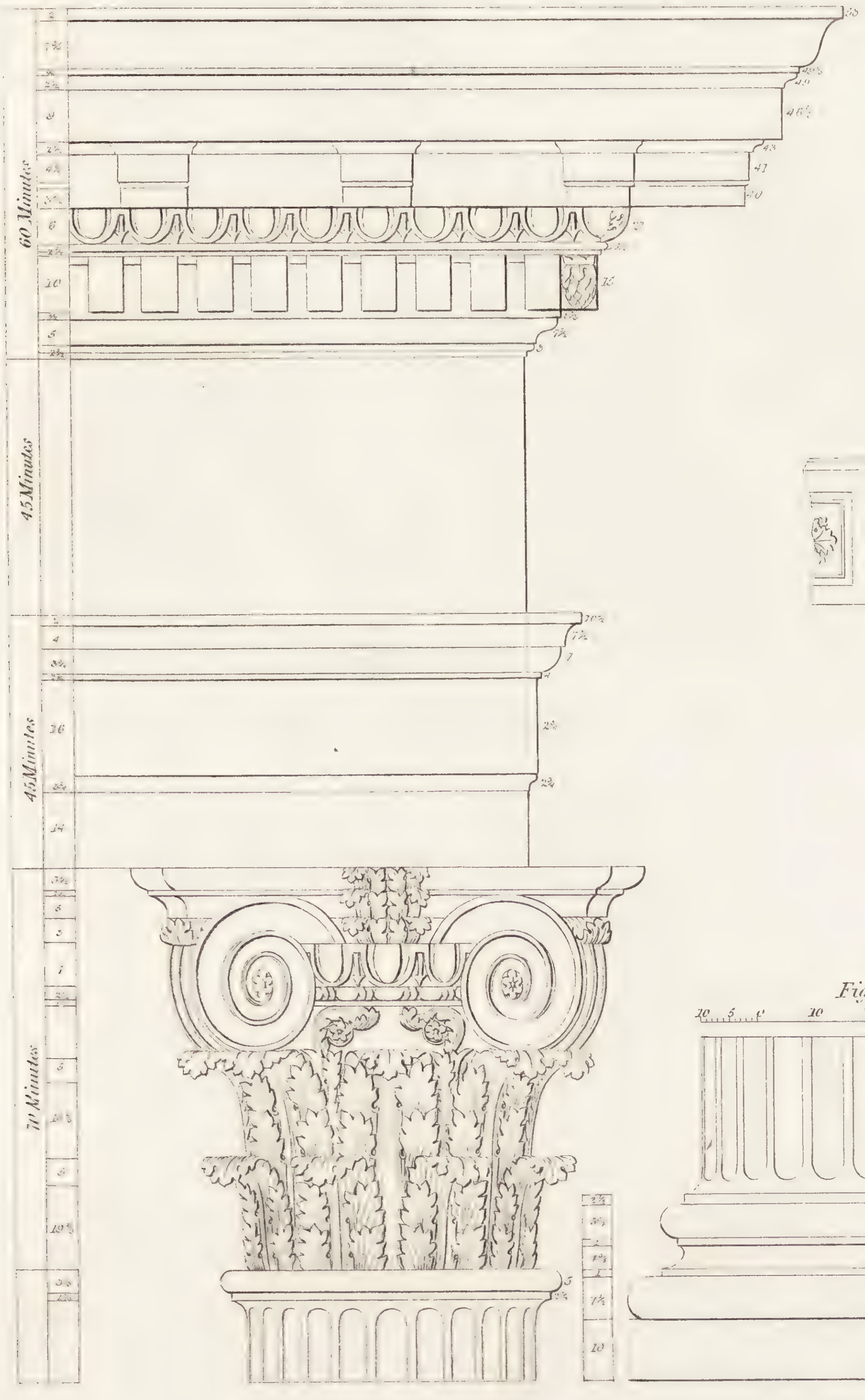


Fig. 3.

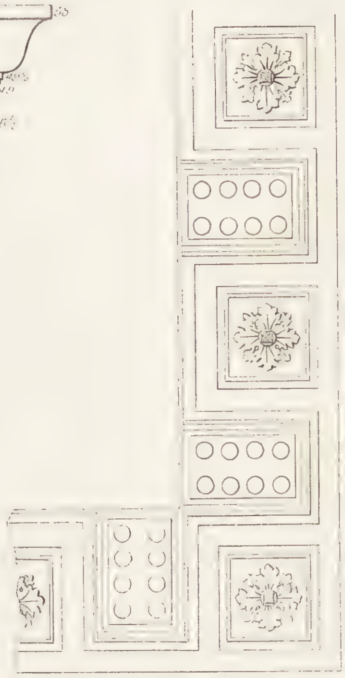
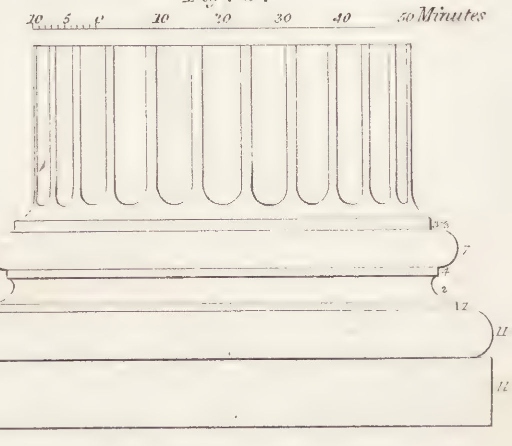
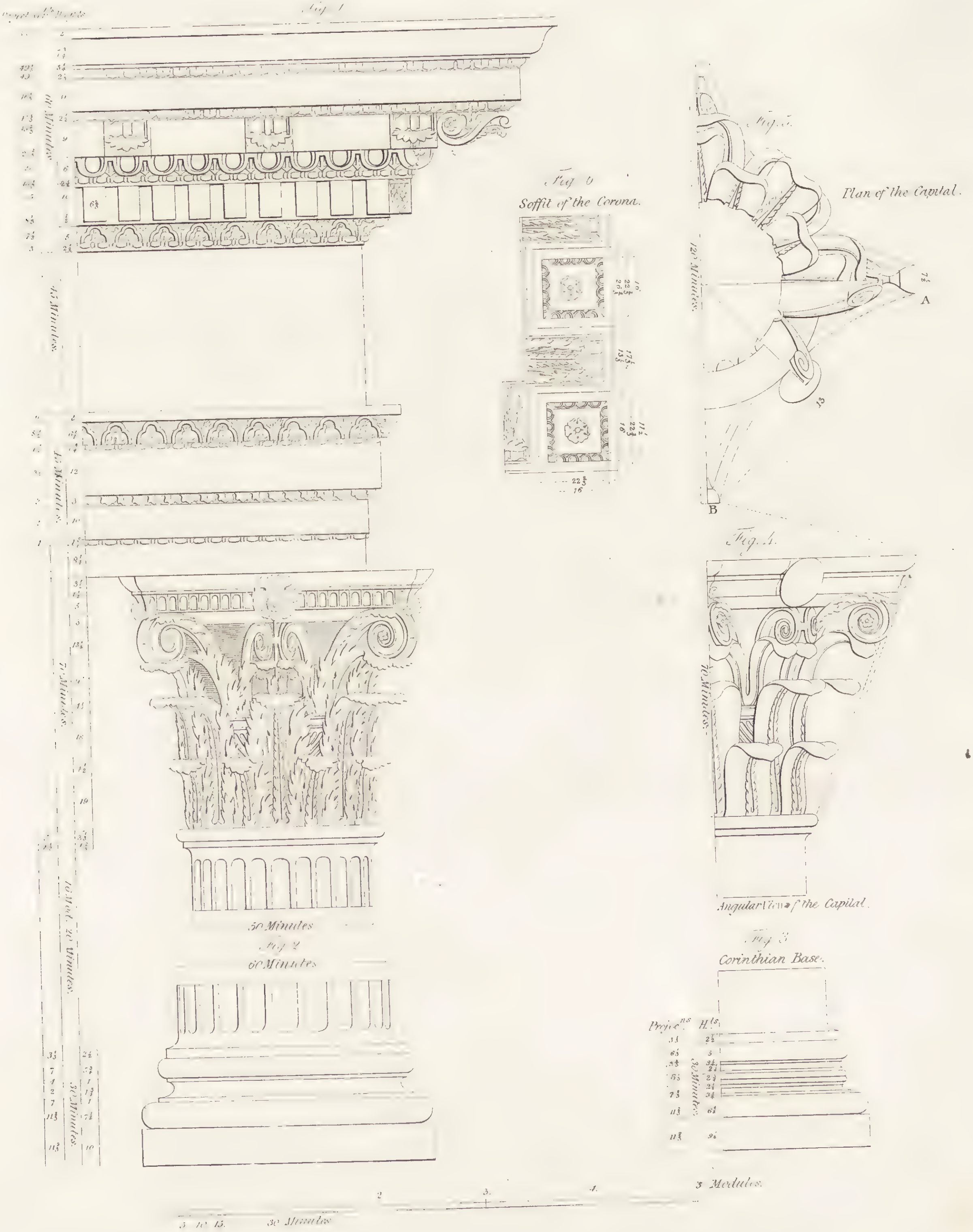


Fig. 2.



ROMAN CORINTHIAN ORDER.

Ap... ... Chambers



London Published by Thos. Kelly, 17, Paternoster Row, March 5, 1848.

THE CORINTHIAN CAPITAL & BASE FROM THE TEMPLE OF TIVOLI.

Fig. 1.

50 Minutes

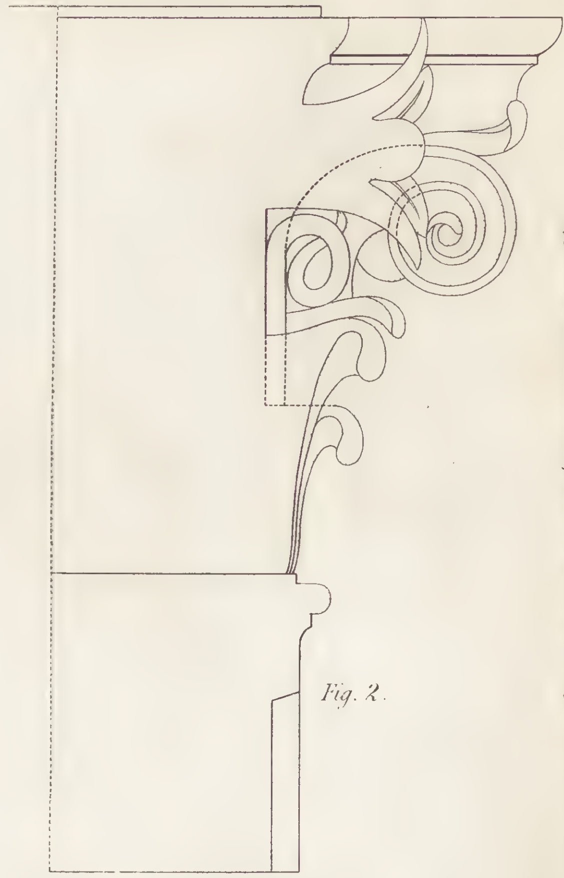


Fig. 2.

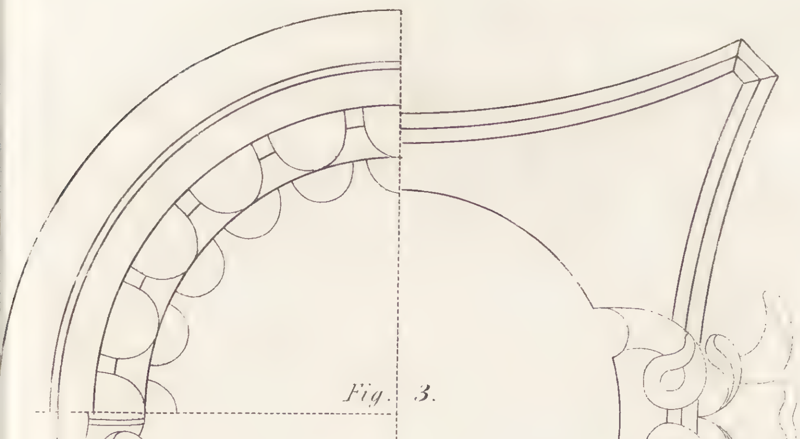


Fig. 3.

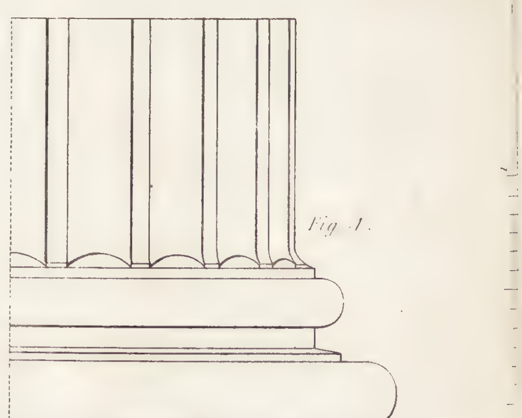
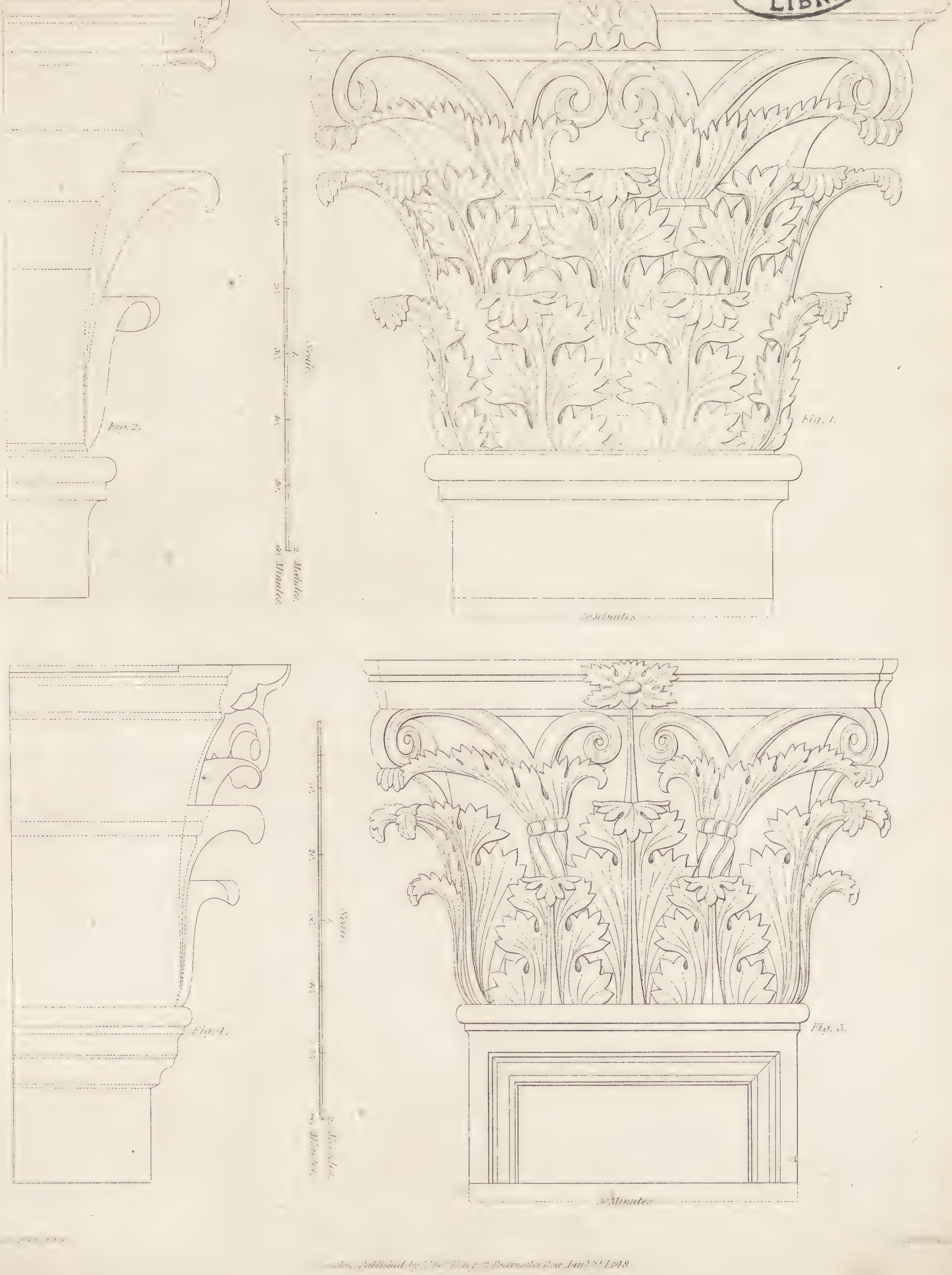


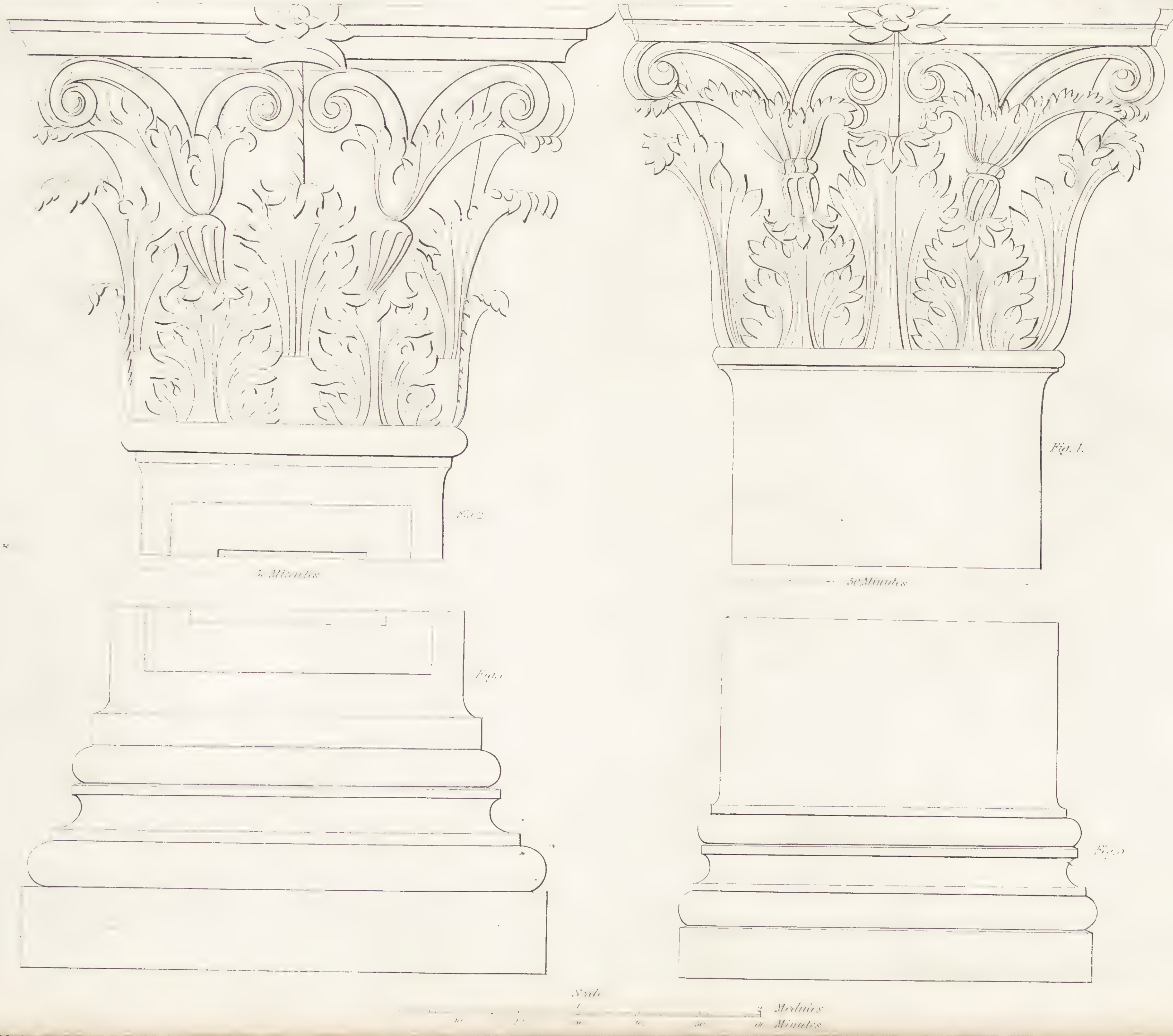
Fig. 4.

GRECIAN CORINTHIAN CAPITALS.



...don, Published by Tho. Kelly, 17 Paternoster Row Jan. 22 1848

GRECIAN CORINTHIAN CAPITALS & BASES TO PILASTERS OR ANTÆ.



FROM THE CHORAGIC MONUMENT OF LYSICRATES.

Fig. 1.

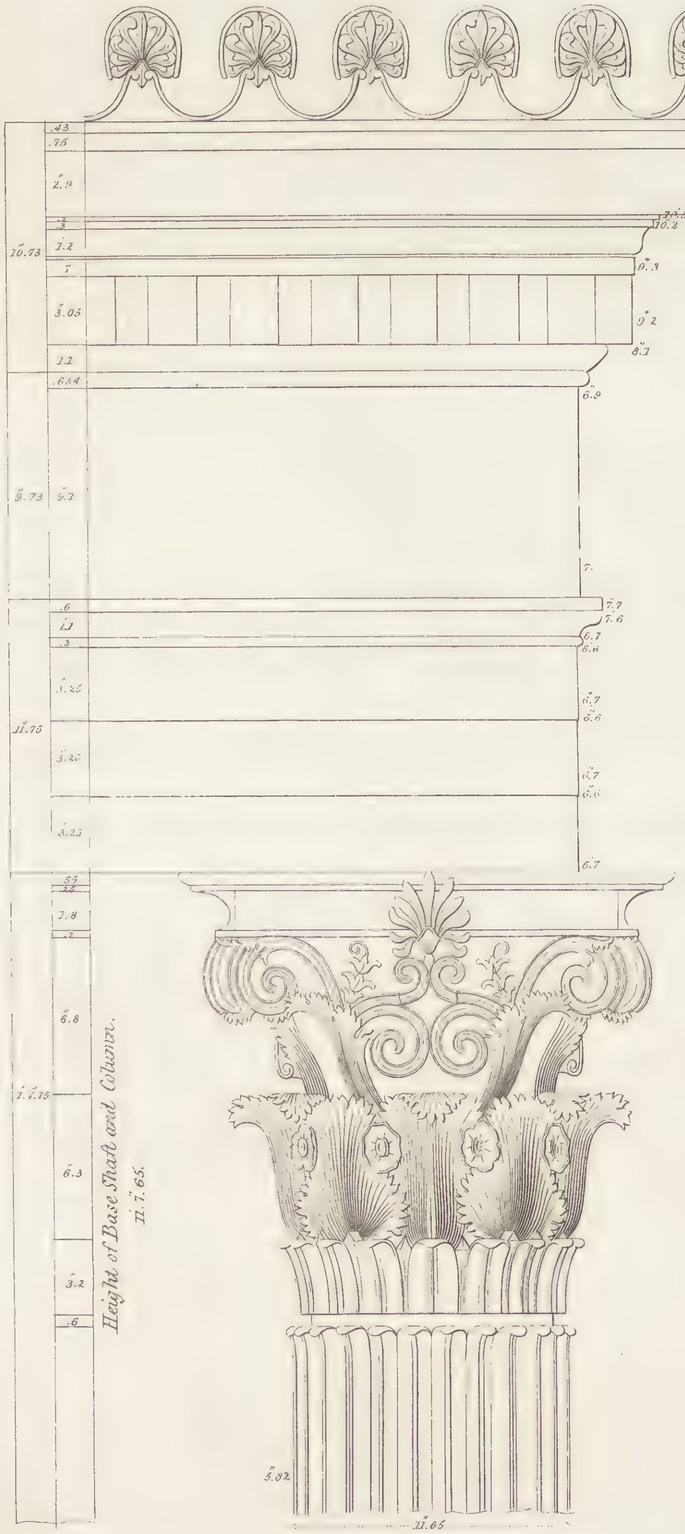


Fig. 3.

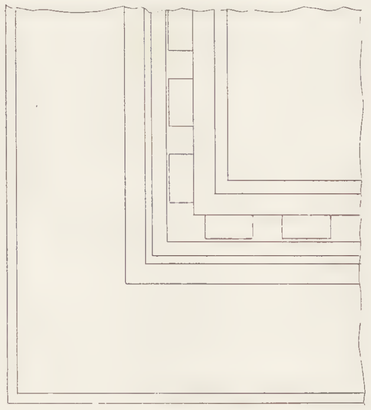
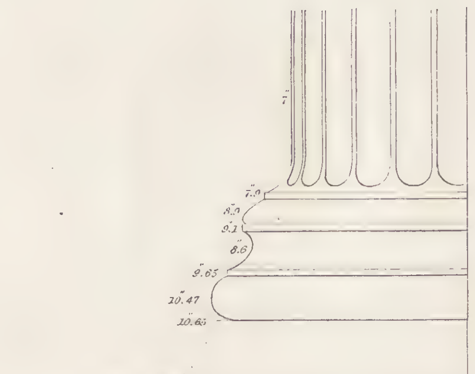


Fig. 2.



Drawn by M. A. Nicholson.

Engraved by W. Symns.

London, Published by Thos. Kelly 17 Paternoster Row, November 1. 1816

GRECIAN ORNAMENTS.

Fig. 1.

Fig. 2.

Fig. 3.

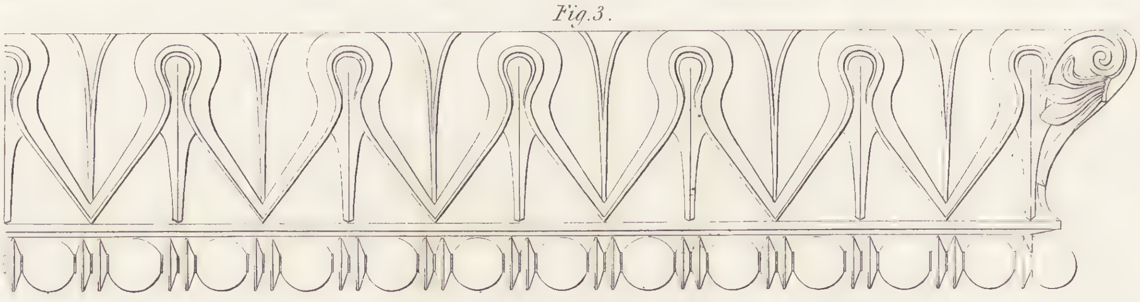
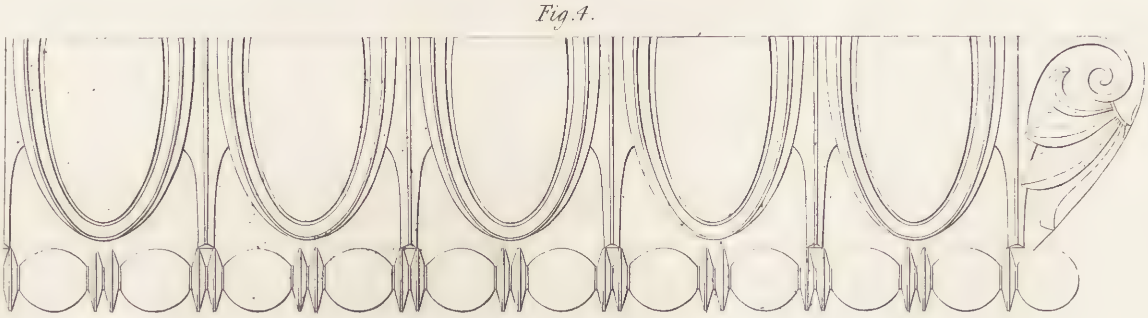


Fig. 4.



Drawn by M. A. Nicholson.

Engraved by E. Gladwin.

London, Published by Thos. Kelly, 17 Paternoster Row. June 5th 1848.

Fig. 1.

Fig. 2. *Fig. 3.*

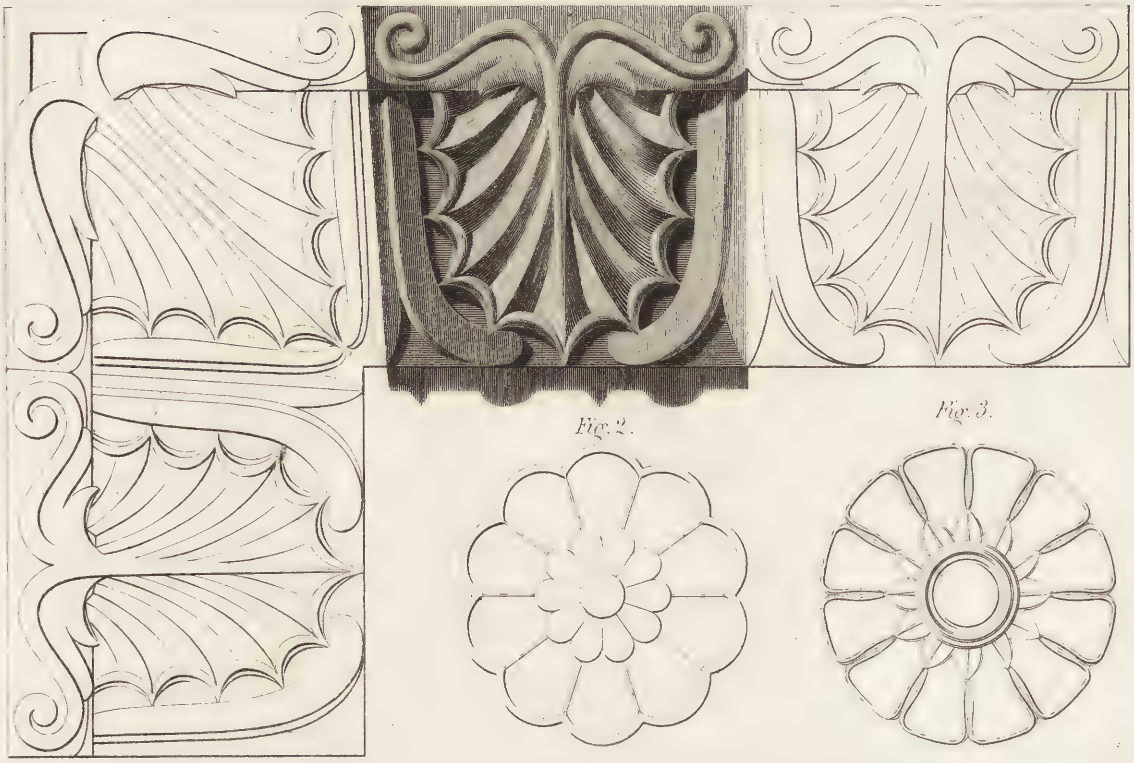
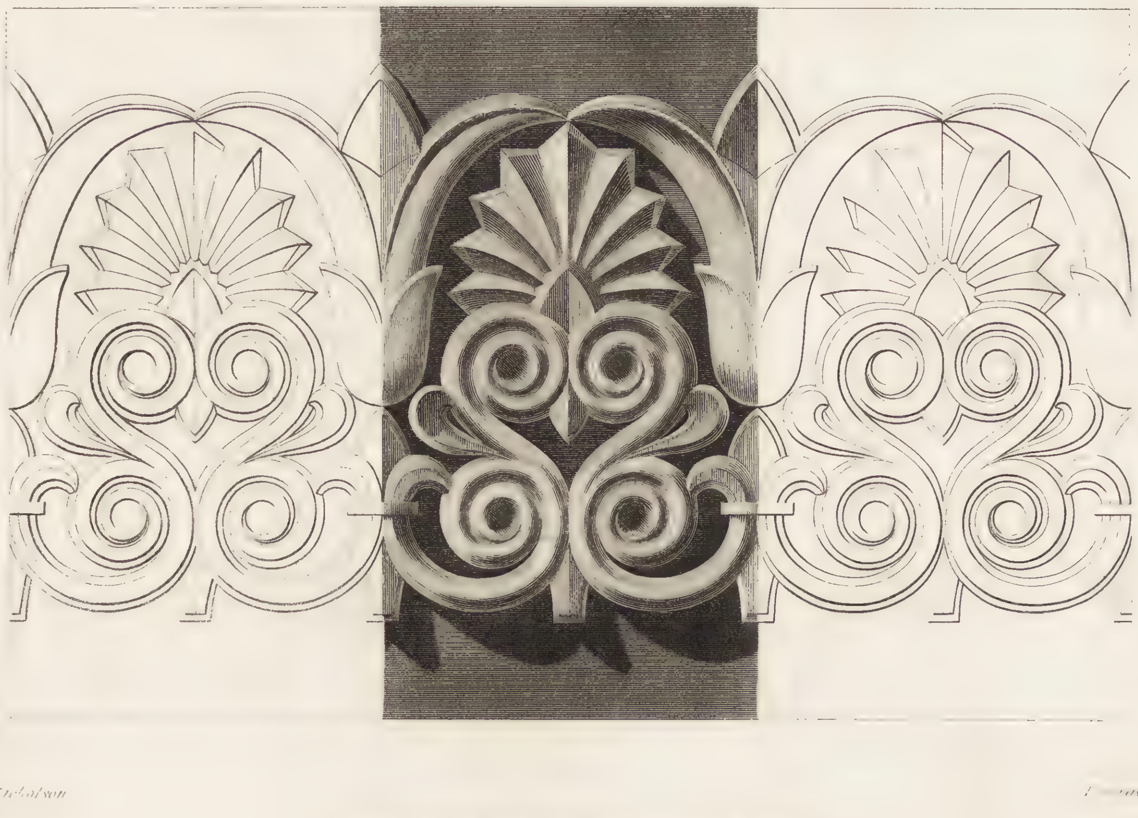


Fig. 4.



Drawn by M. A. Nicholson

London, Published by Thos Kelly 17, Paternoster Row

PLATE XV[illegible]

GRECIAN AND ROMAN ORNAMENTS.

Fig. 1.

Fig. 2.

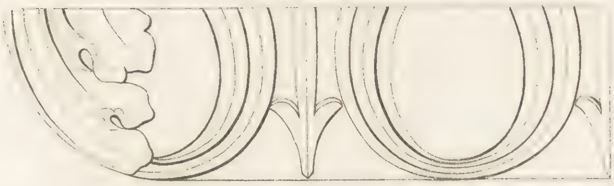


Fig. 3.

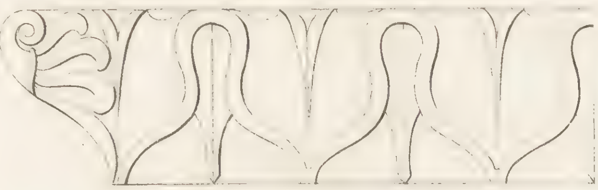


Fig. 4.

Fig. 5.

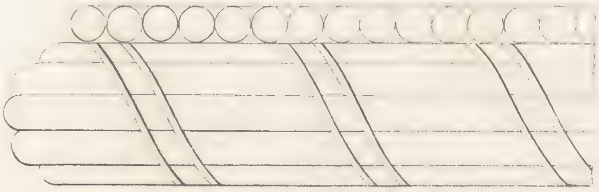


Fig. 6.

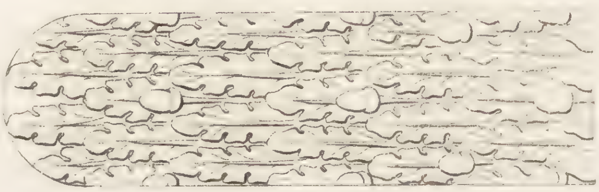


Fig. 9.

Fig. 10.

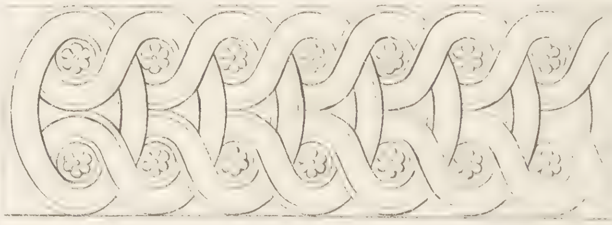


Fig. 7.

Fig. 8.

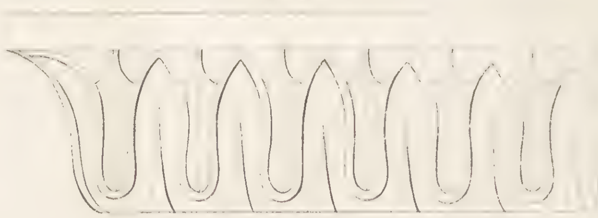


Fig. 11.

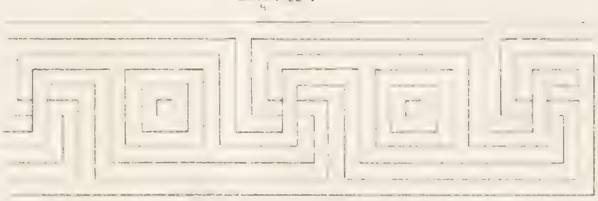
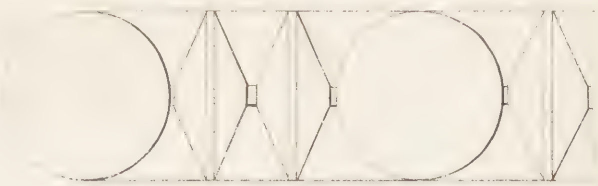


Fig. 12.



London, Published by [illegible] 1848

FIRST-RATE HOUSE.

PLATE XX

Fig. 5.

Fig. 1.

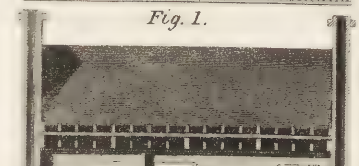


Fig. 2.

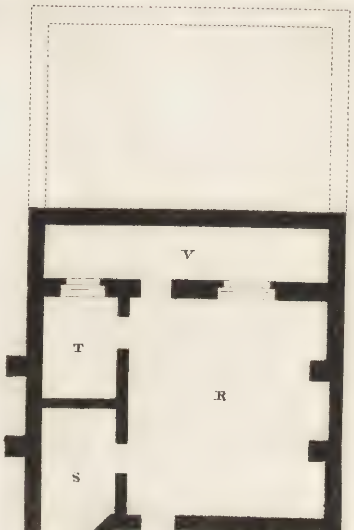


Fig. 3.

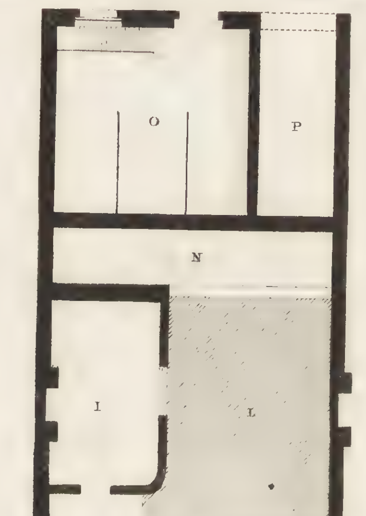


Fig. 4.

Designed by M.A. Nicholson.

Engraved by R. Hillard.

London. Published by Thos. Kelly. 17. Paternoster Row. July 25. 1848.

SECOND RATE HOUSE.

Fig. 1.

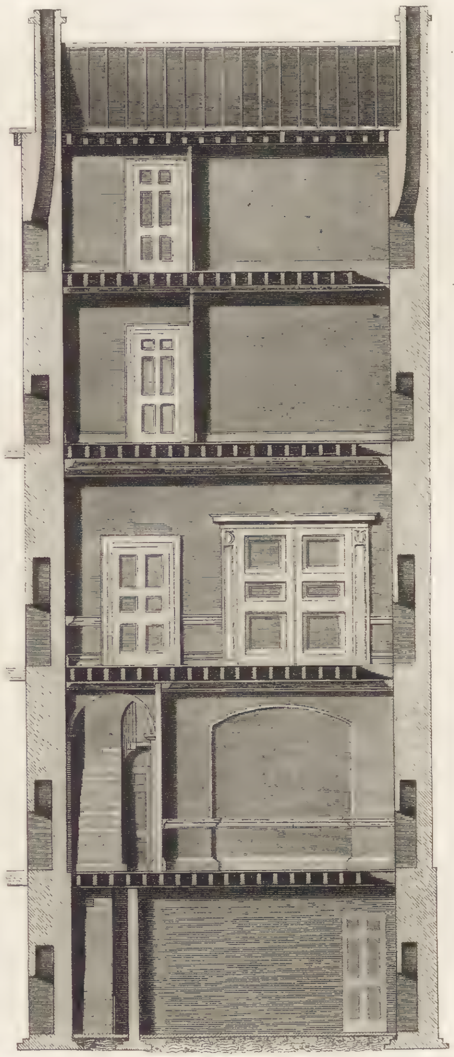
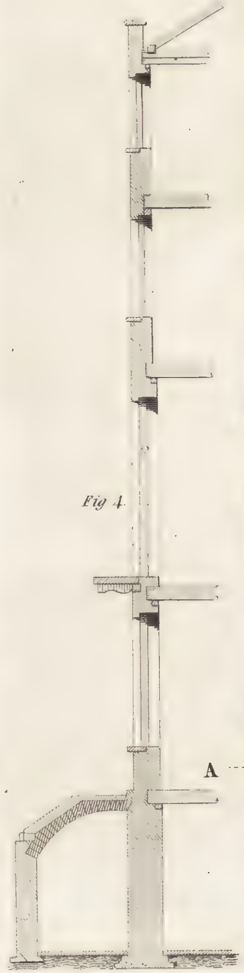


Fig 2.



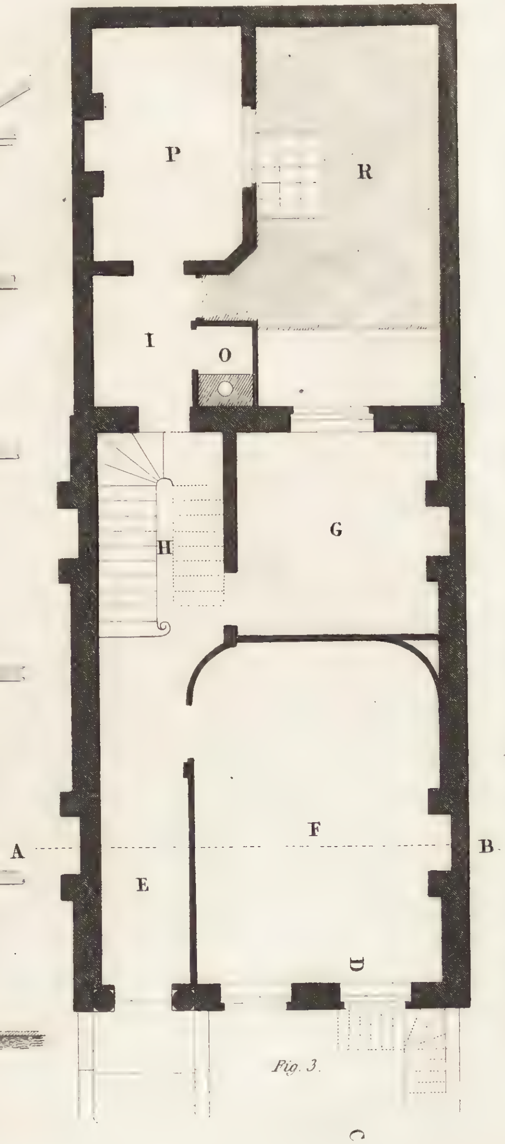


Fig. 3.

10 5 10 20 30 40 feet.

Drawn by M. A. Nicholson.

Engraved by Symns

London Published by Thos Kelly 17 Paternoster Row, July 3rd 1848.

THIRD-RATE HOUSE.

Fig 1.

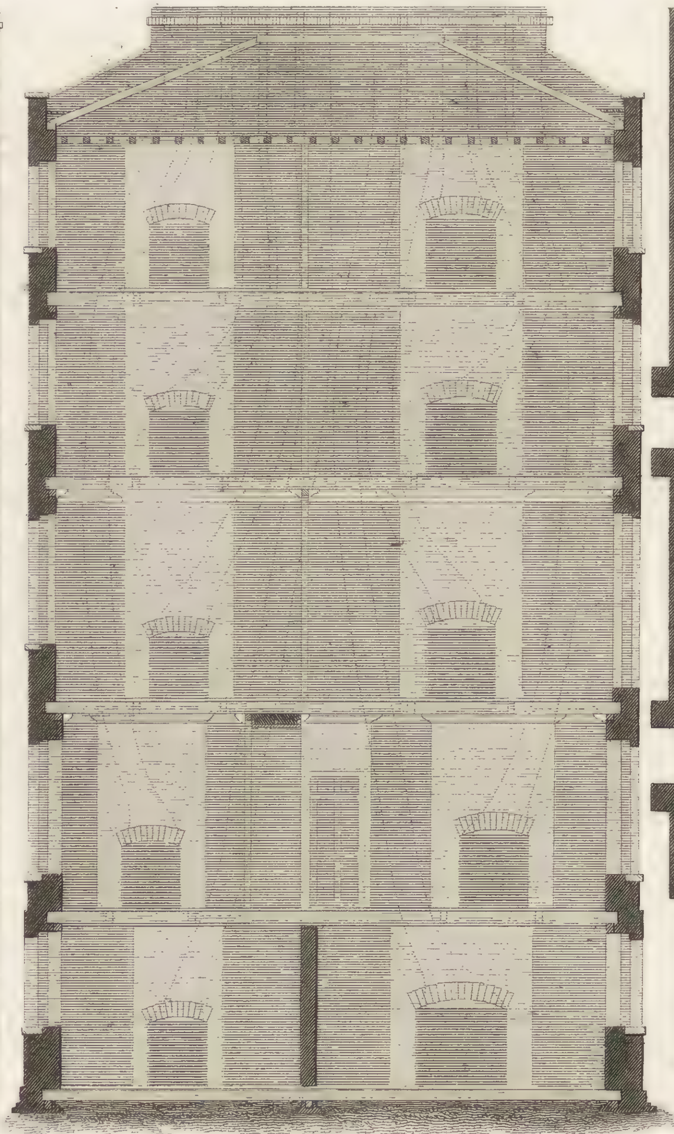


Fig 2.

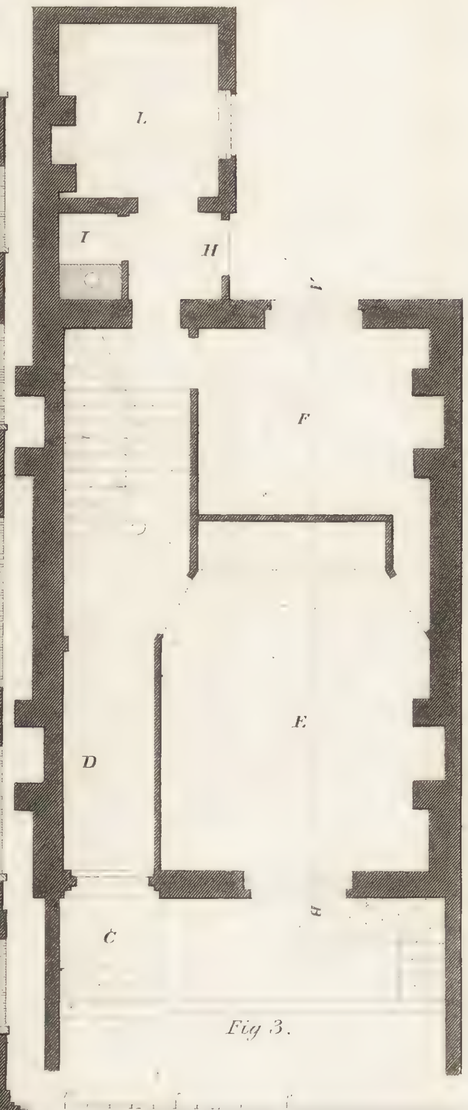


Fig 3.

Drawn by M.A. Nicholson.

Engraved by W. Symns.

London. Published by Thomas Kelly. 17. Paternoster Row. Nov.r 15.1848.

FOURTH-RATE HOUSE.

Fig 1

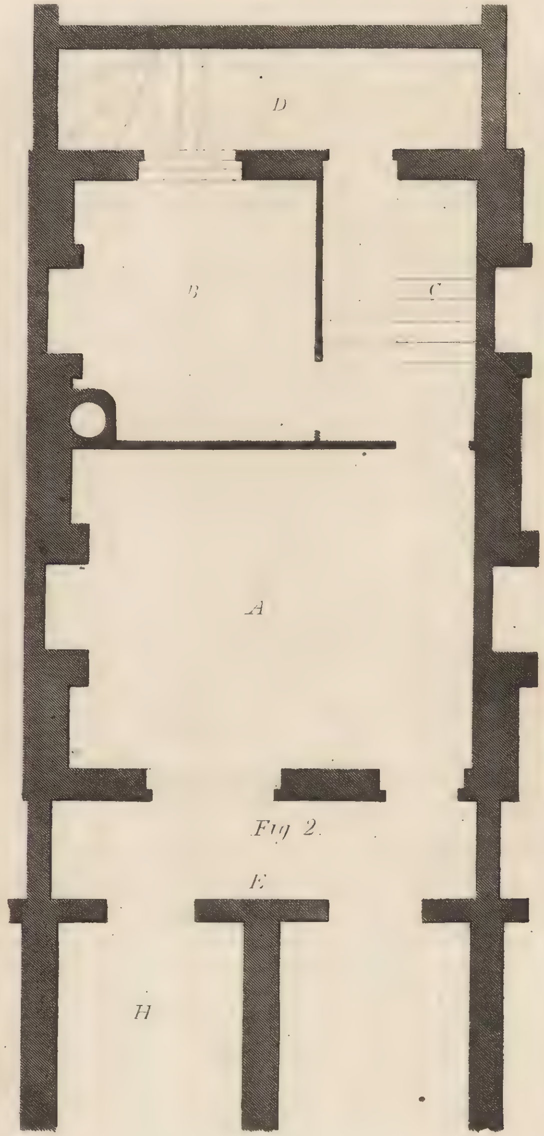


Fig 2.

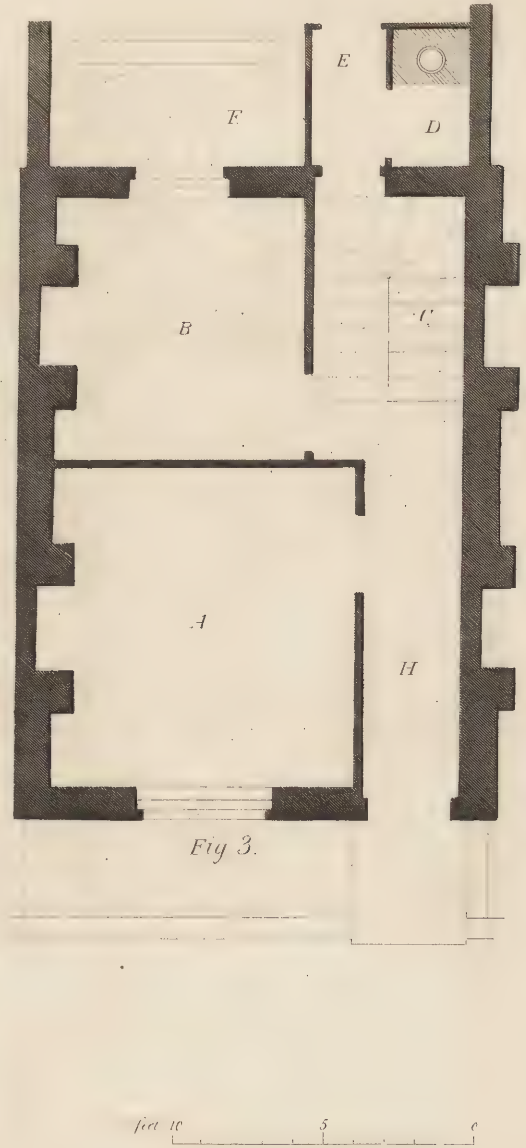


Fig 3.

Drawn by M.A. Nicholson.

Engraved by W. Symns.

London, Published by Thos. Kelly, 17, Paternoster Row. Sep.r 23. 1836.

ELEVATION.

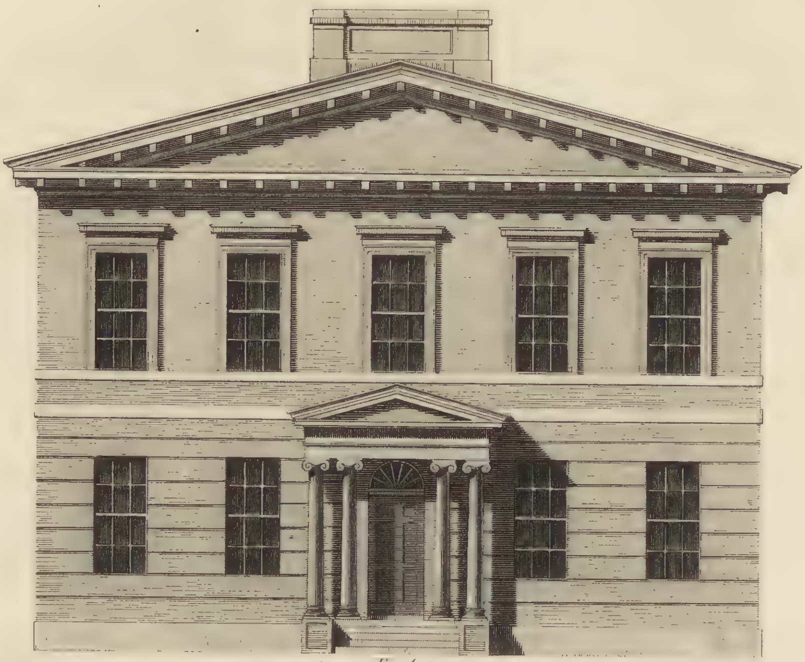


Fig. 1.

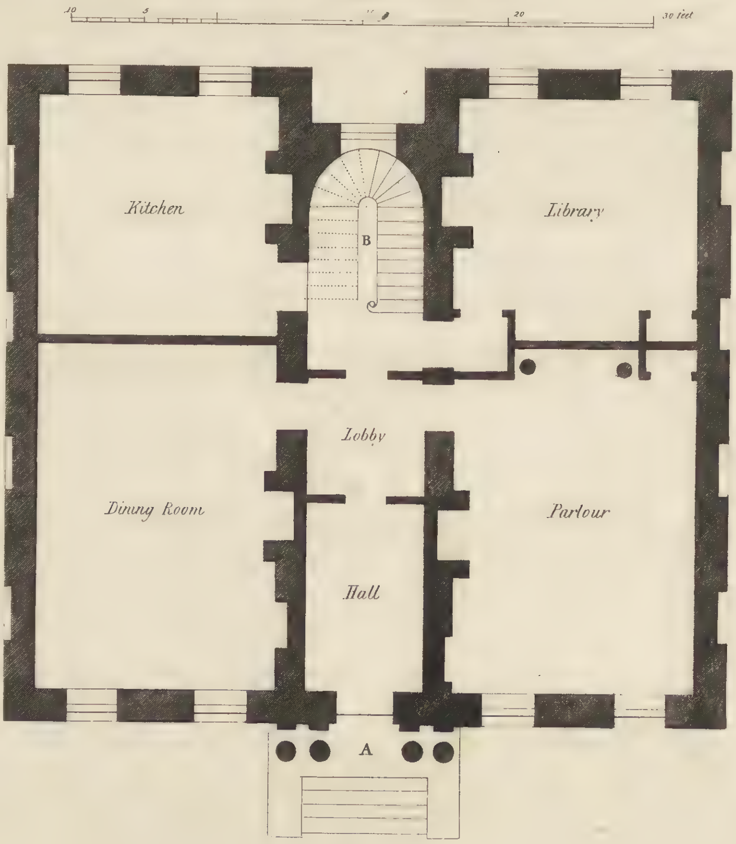


Fig. 2.

GROUND PLAN.

Drawn by M. A. Nicholson.

Engraved by W. Symns.

London. Published by Thos. Kelly. 17. Paternoster Row. June 1. 1848.

ELEVATION.

Fig. 1.

CHAMBER PLAN.

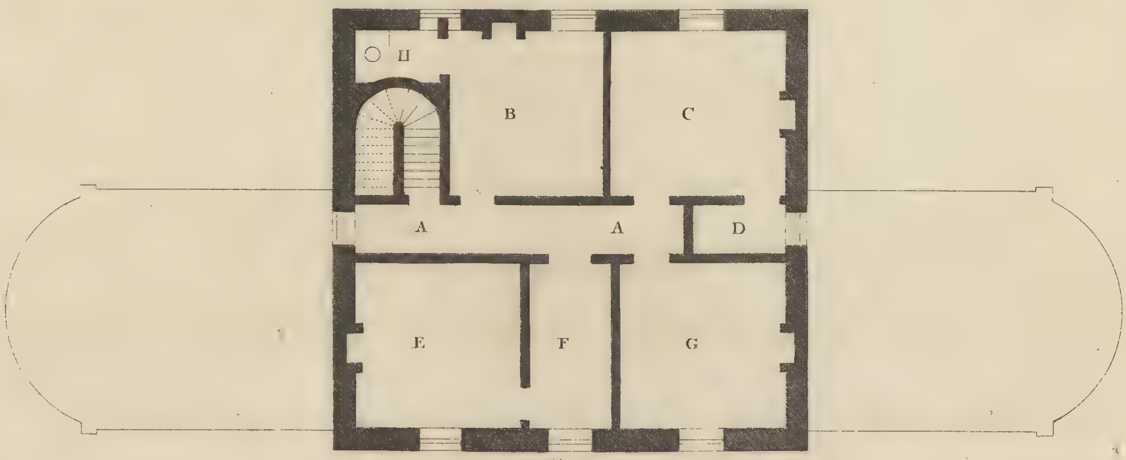


Fig. 3.

10 5 0 10 20 30 feet

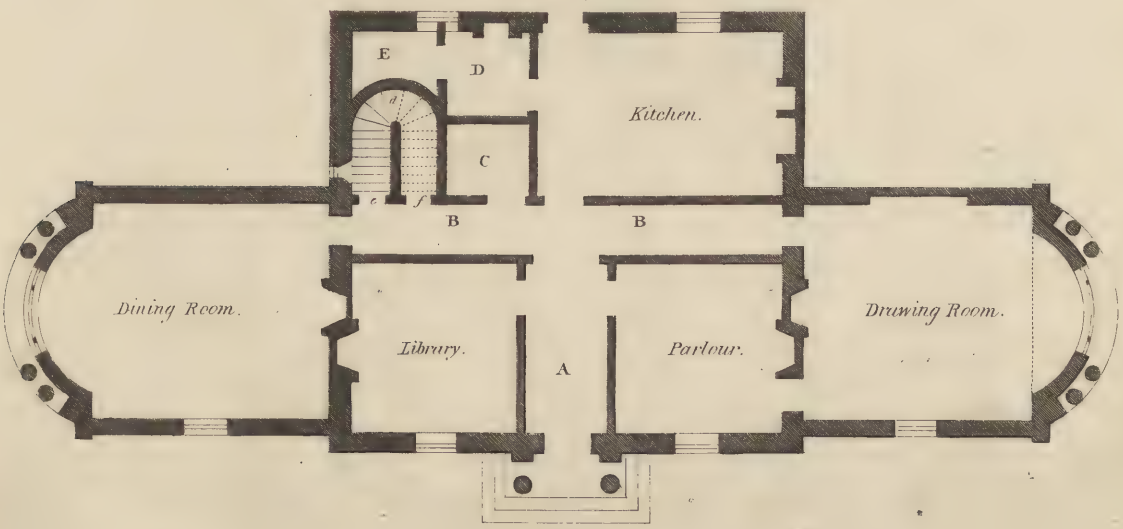


Fig. 2.

Designed by M. A. Nicholson.

GROUND PLAN.

Engraved by H. Adlard.

London. Published by Thos. Kelly 17, Paternoster Row, Augt. 9. 1848.

ELEVATION.

Fig. 1.

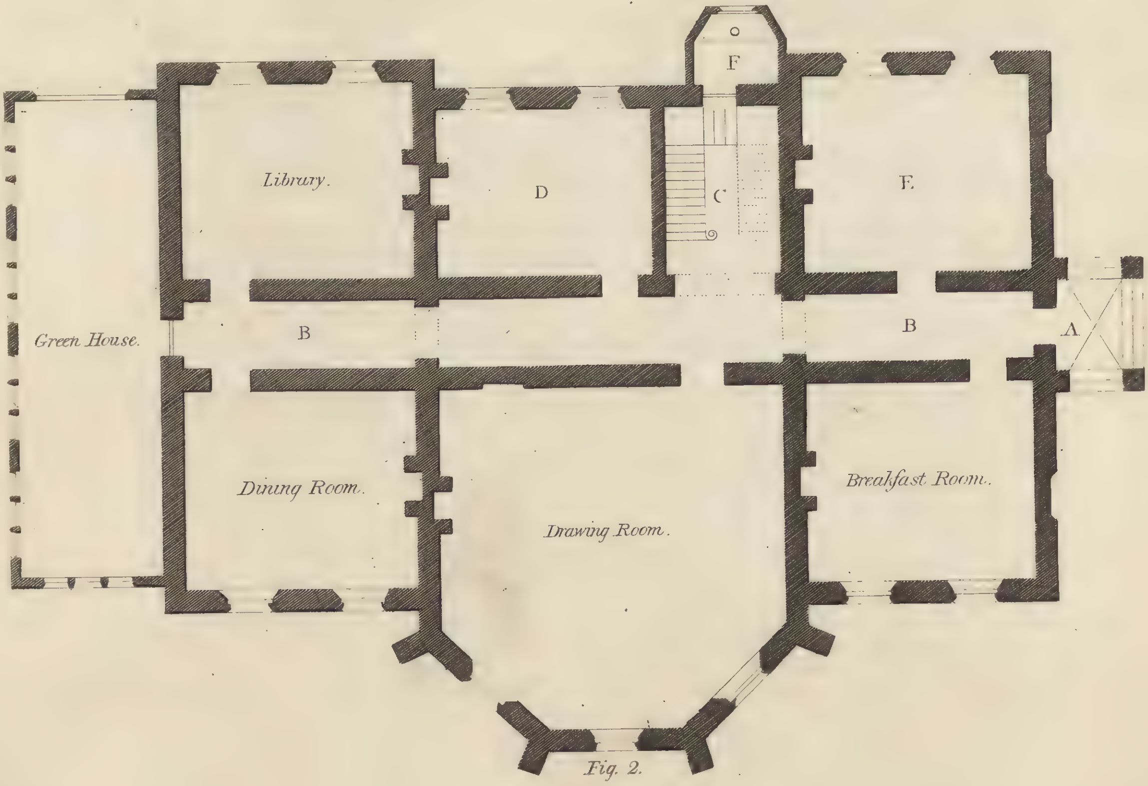


Fig. 2.

GROUND PLAN

Designed by M. A. Nicholson.

Engraved by W. Symns.

London Published by Thos. Kelly, 17, Paternoster Row, July 25, 1848.

ELEVATION.

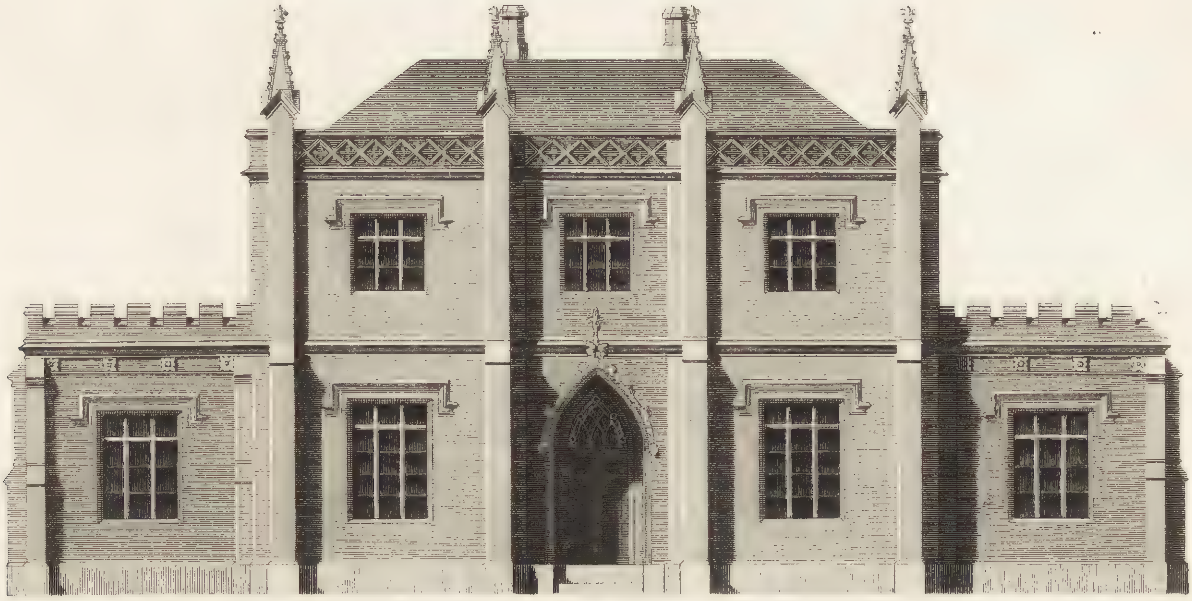


Fig. 1.

Scale of 10 5 0 10 20 30 Feet

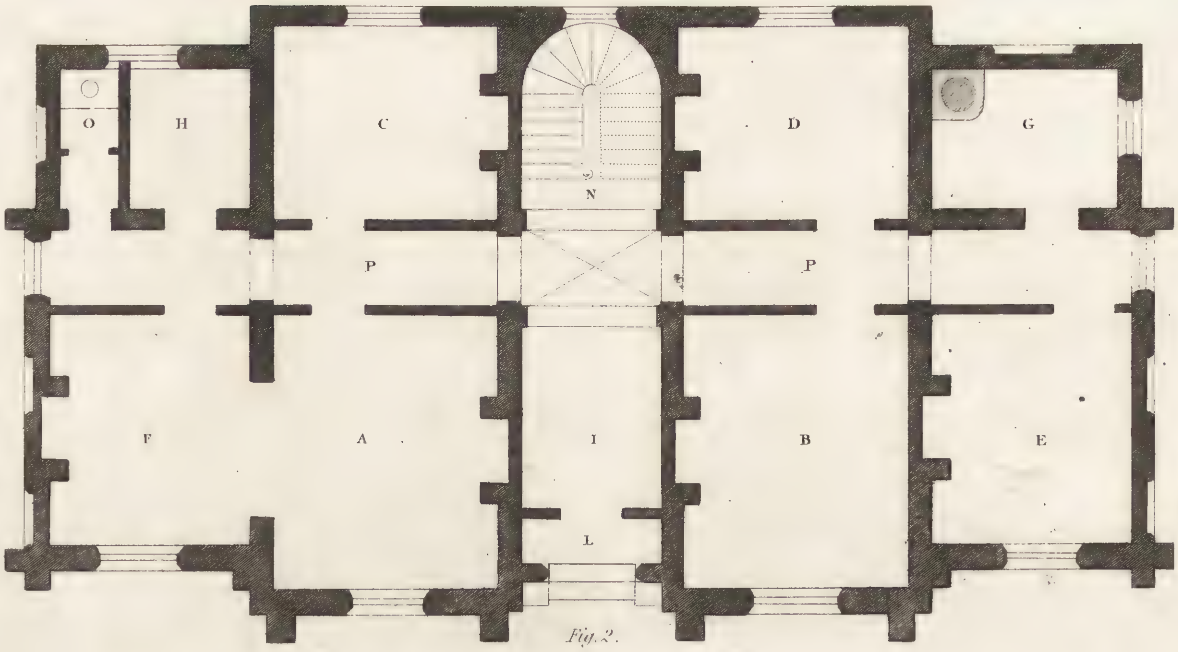


Fig. 2.

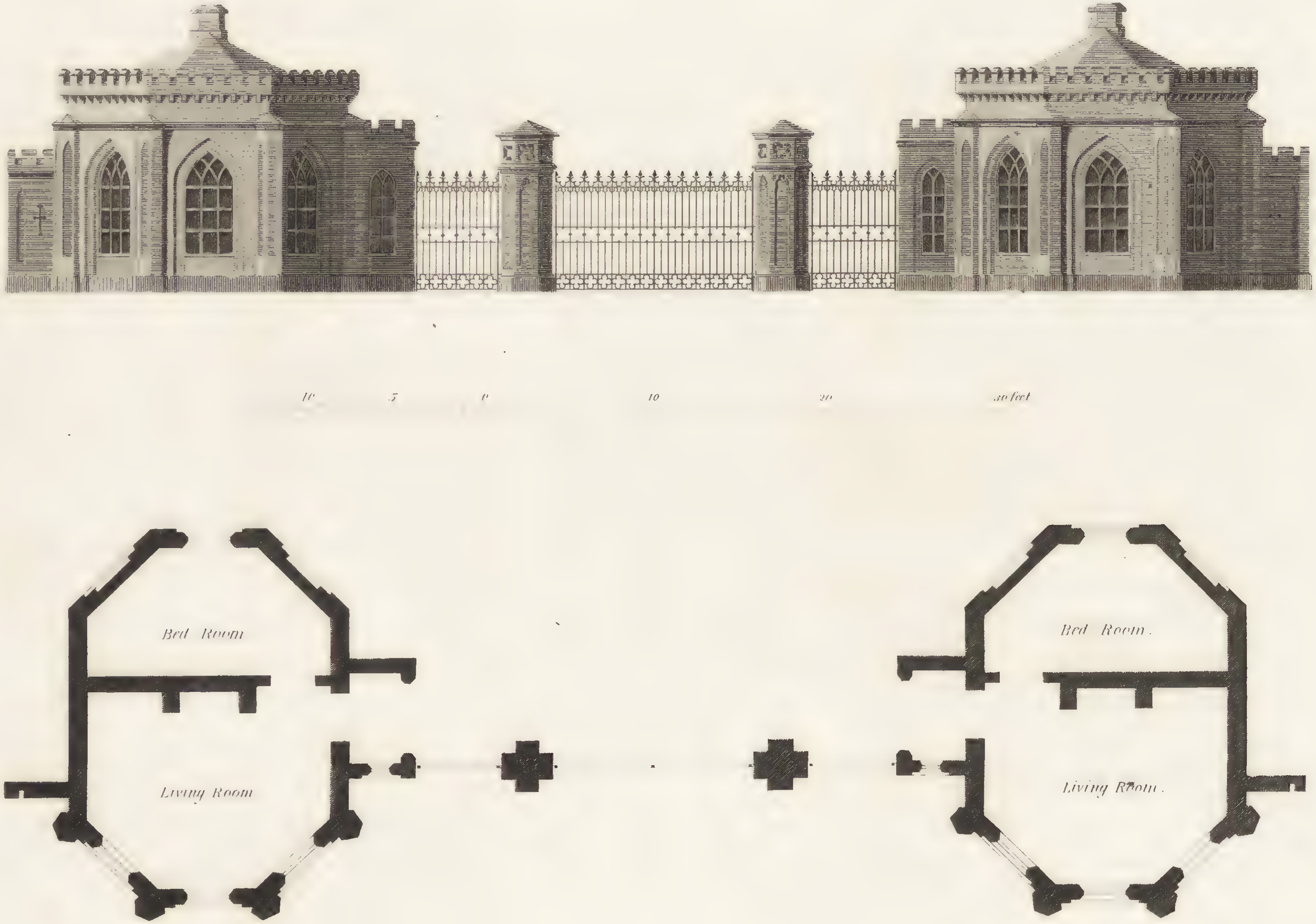
GROUND PLAN.

Designed by M. A. Nicholson.

Engraved by W. Symns.

London. Published by Thos. Kelly, 17, Paternoster Row, August. 1. 1848.

LODGE AND ENTRANCE TO A MANSION.



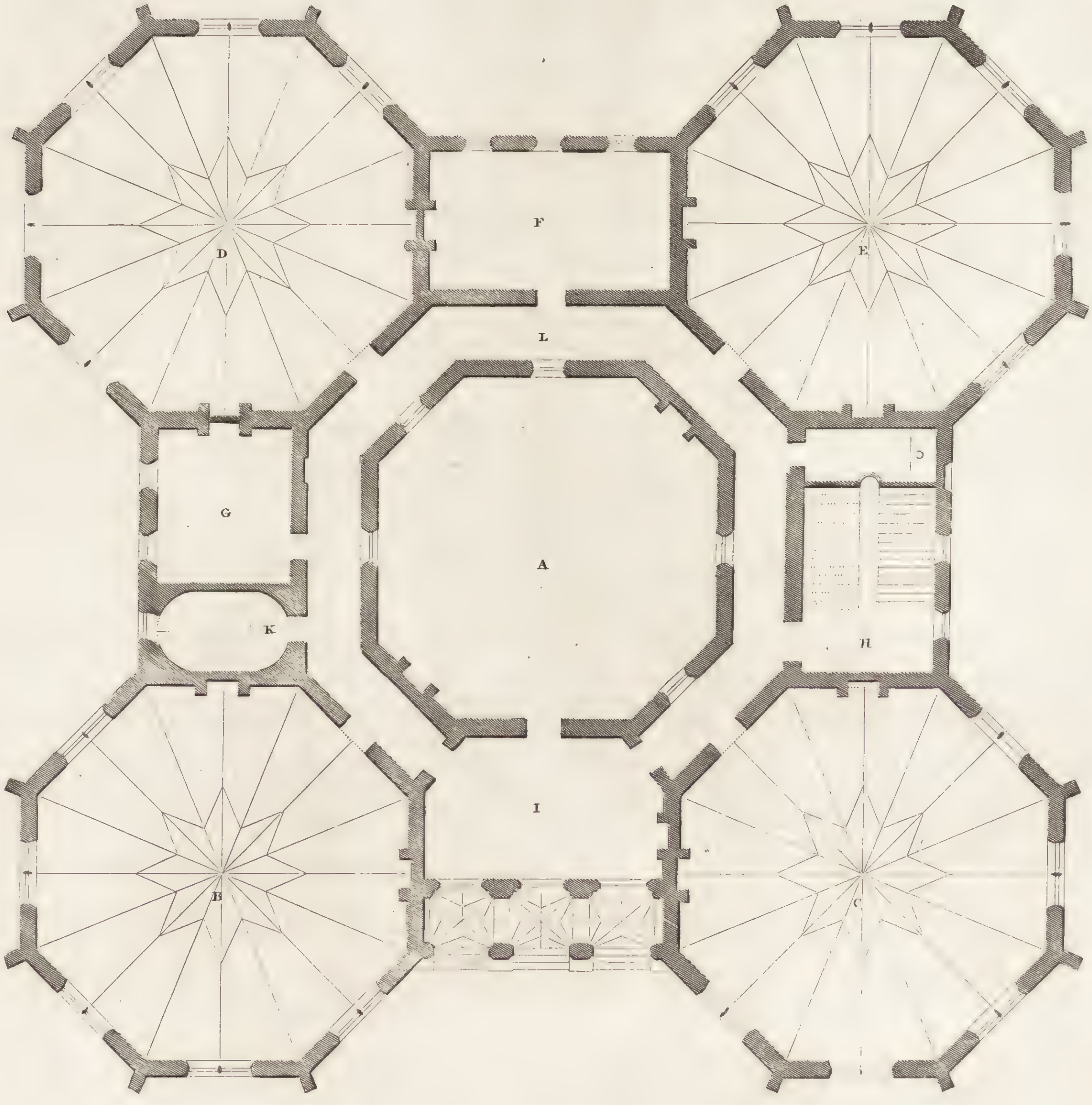
Designed by M. A. Nicholson

Engraved by H. Adlard

London. Published by Thomas Kelly. 17. Paternoster Row. August 16. 1848.

GROUND PLAN OF A DESIGN FOR A MANSION,

IN THE CASTELLATED STYLE.



10 5 0 10 20 30 40 50 60 70 feet.

esigned by M. A. Nicholson.

Engraved by R. ...

London, Published by Thos. Kelly 17 Paternoster Row June 1.1848.

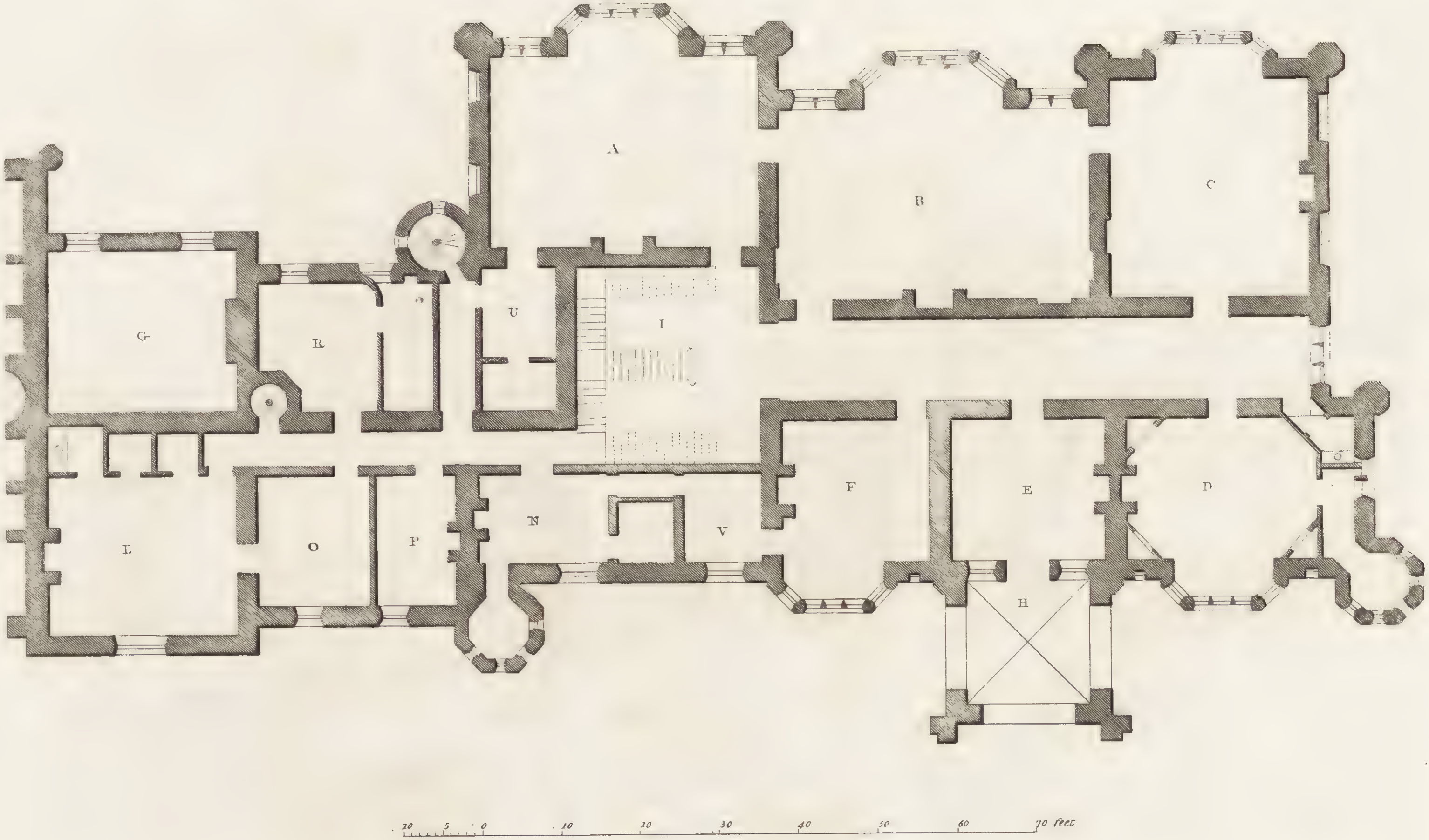
DESIGN FOR A MANSION IN THE CASTELLATED STYLE.

Designed by M. A. Nicholson.

Engraved by Arch.d Dick.

London Published by Thos. Kelly, 17, Paternoster Row, Sept. 20. 1848.

GROUND PLAN OF THE SEAT OF HENRY MONTEITH ESQ^R



Designed by M. A. Nicholson

London Published by Thos Kelly 17 Paternoster Row, June 1, 1848

PRINCIPAL ELEVATION OF THE SEAT OF HENRY MONTEITH ESQ.

ERECTED AT CARSTAIRS, ADJACENT TO THE RIVER CLYDE.

Designed by M. A. Nicholson Architect.

Engraved by Archibald Dick.

London, Published by Thos. Kelly, 17 Paternoster Row; Sept.r 4th 1848.

ELEVATION.

PLATE XLII.

Fig. 1.

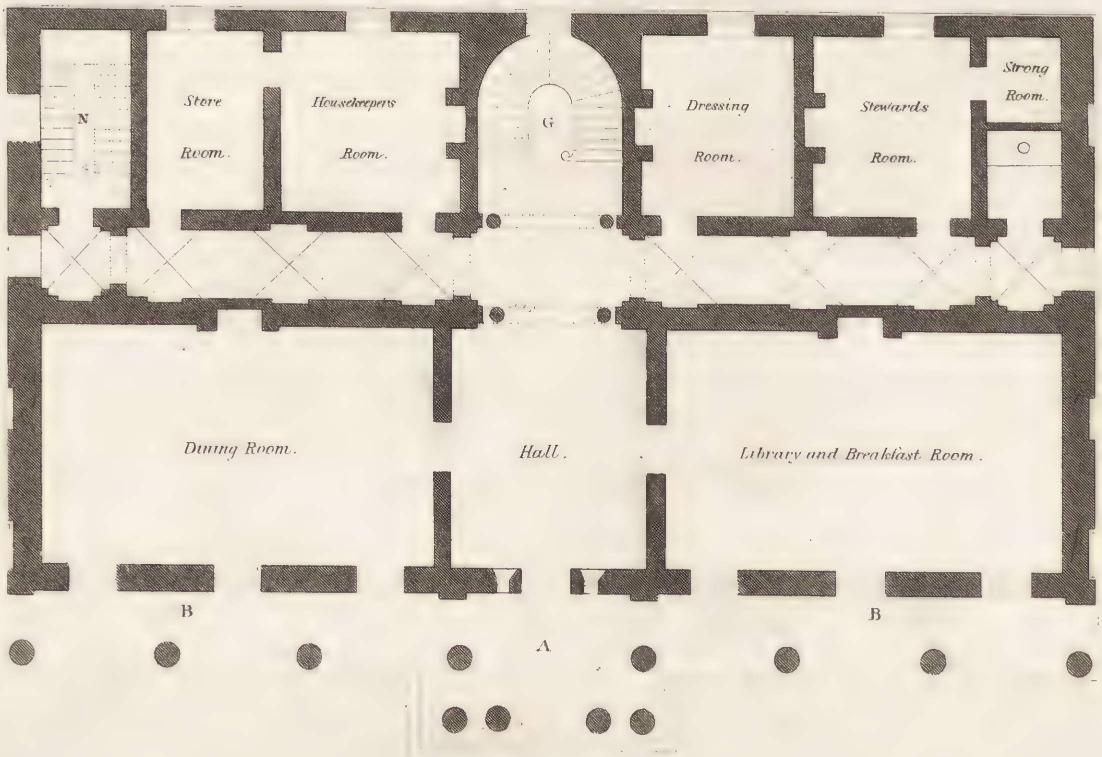


Fig. 2.

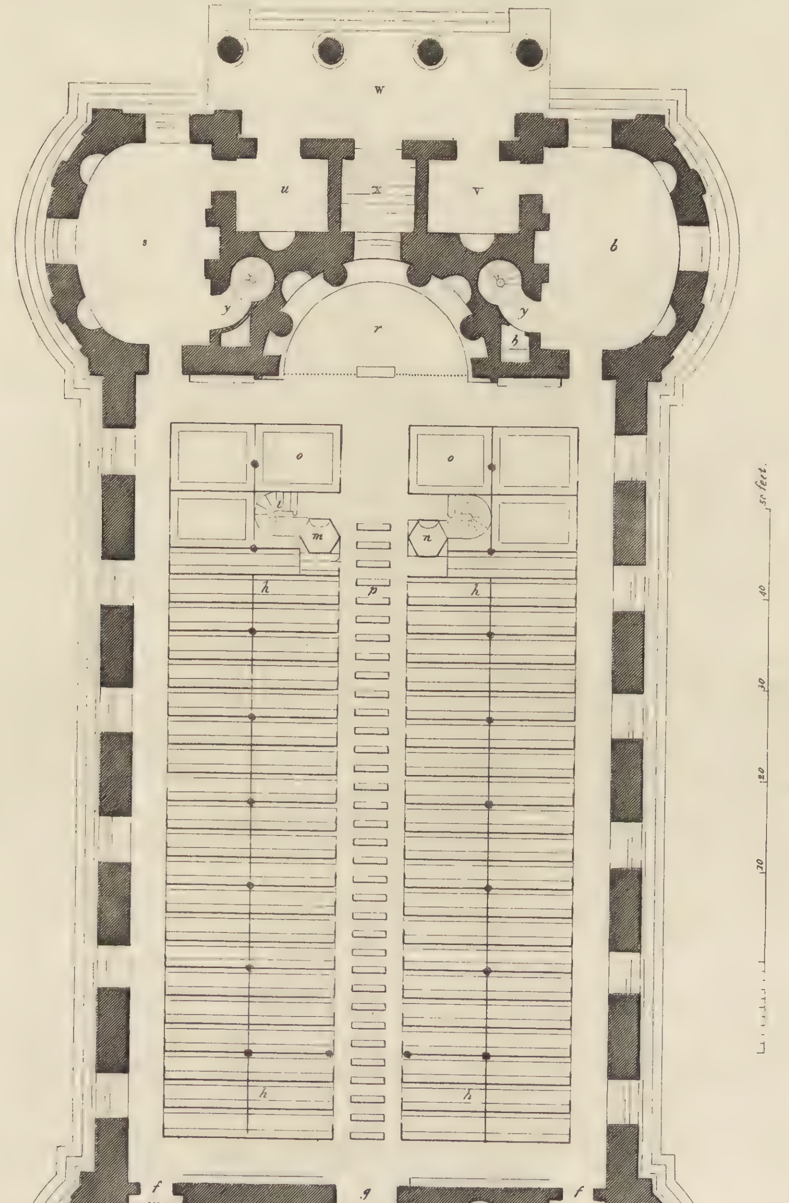
Designed by M. A. Nicholson.

GROUND PLAN.

Engraved by W. Sy

London, Published by Thos Kelly 17, Paternoster Row July 5 1848.

GROUND PLAN, OF A CHURCH IN THE GRECIAN STYLE.



Designed by M. A. Nicholson.

Engraved by E. Kennion

London, Published by Tho.s Kelly, 17 Paternoster Row Oct.r 25 1848.

FRONT ELEVATION OF A CHURCH IN THE GRECIAN STYLE.

Design'd & Drawn by M.A. Nicholson

Engraved on Steel by A. Dick.

London, Published by Thos. Kelly, 17 Paternoster Row March 20. 1848

FLANK ELEVATION OF A CHURCH,
IN THE GRECIAN STYLE.

Designed & Drawn by M. A. Nicholson.

Engraved by Edw.d Kennion.

BACK ELEVATION OF A CHURCH IN THE GRECIAN STYLE.

Drawn by A. A. Nicholson

Engraved by A. Inck

London, Published by Thos. Kelly, 17 Paternoster Row, April 24 1848.

LONGITUDINAL SECTION OF A CHURCH, IN THE GRECIAN STYLE.

Designed and Drawn by M. A. Nicholson. Engraved by A. Dick.

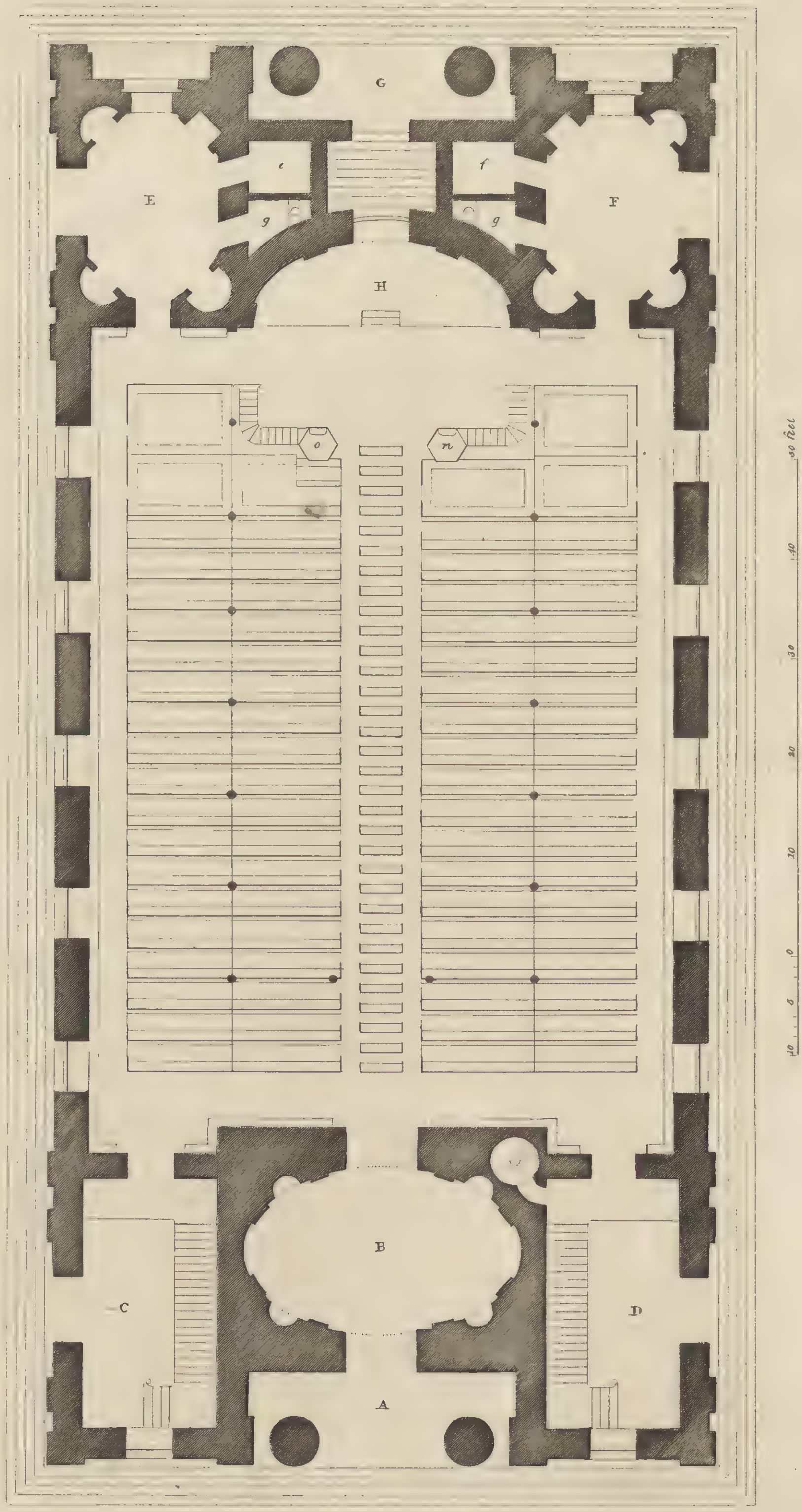
TRANSVERSE SECTION

PLATE XLVIII

Designed & Drawn by M.A. Nicholson. 10 5 0 10 20 30 40 50 feet Engraved by Edw.d Kernot

London Published by Tho.s Kelly 17 Paternoster Row, Oct.r 23 1843

GROUND PLAN.
OF A CHAPEL.



[illegible]
Engraved by [illegible]
London, Published by [illegible]

PLATE I.

PRINCIPAL ELEVATION OF A CHAPEL.

Designed & drawn by [illegible]

FLANK ELEVATION OF A CHAPEL.

Paternoster Row Nov 22 1848

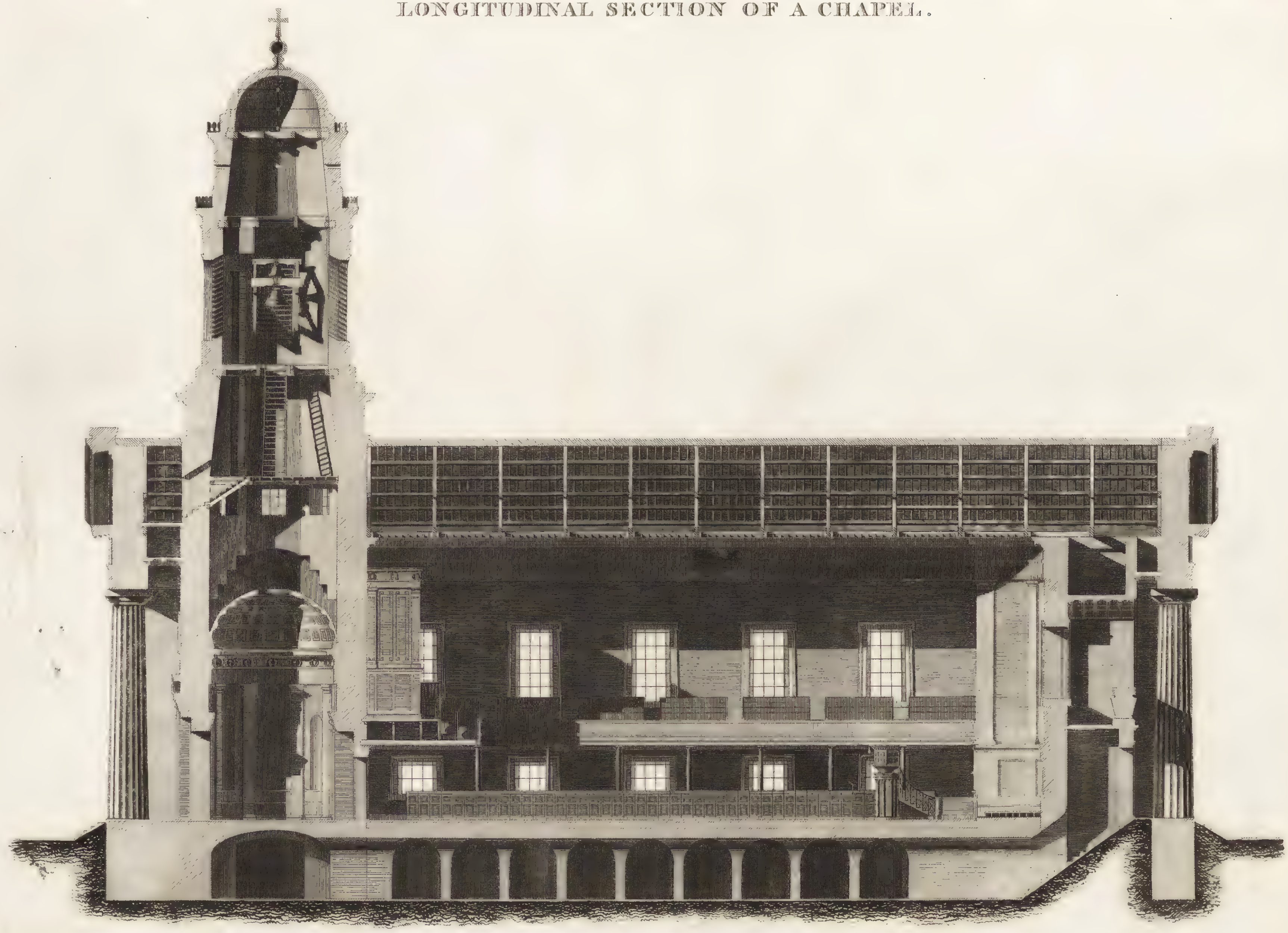
BACK ELEVATION OF A CHAPEL

Designed & Drawn by M.A. Nicholson. Engraved by Edw.d Kernot

London. Published by Thos. Kelly, 17 Paternoster Row, July 1. 1848.

PLATE LIII.

LONGITUDINAL SECTION OF A CHAPEL.



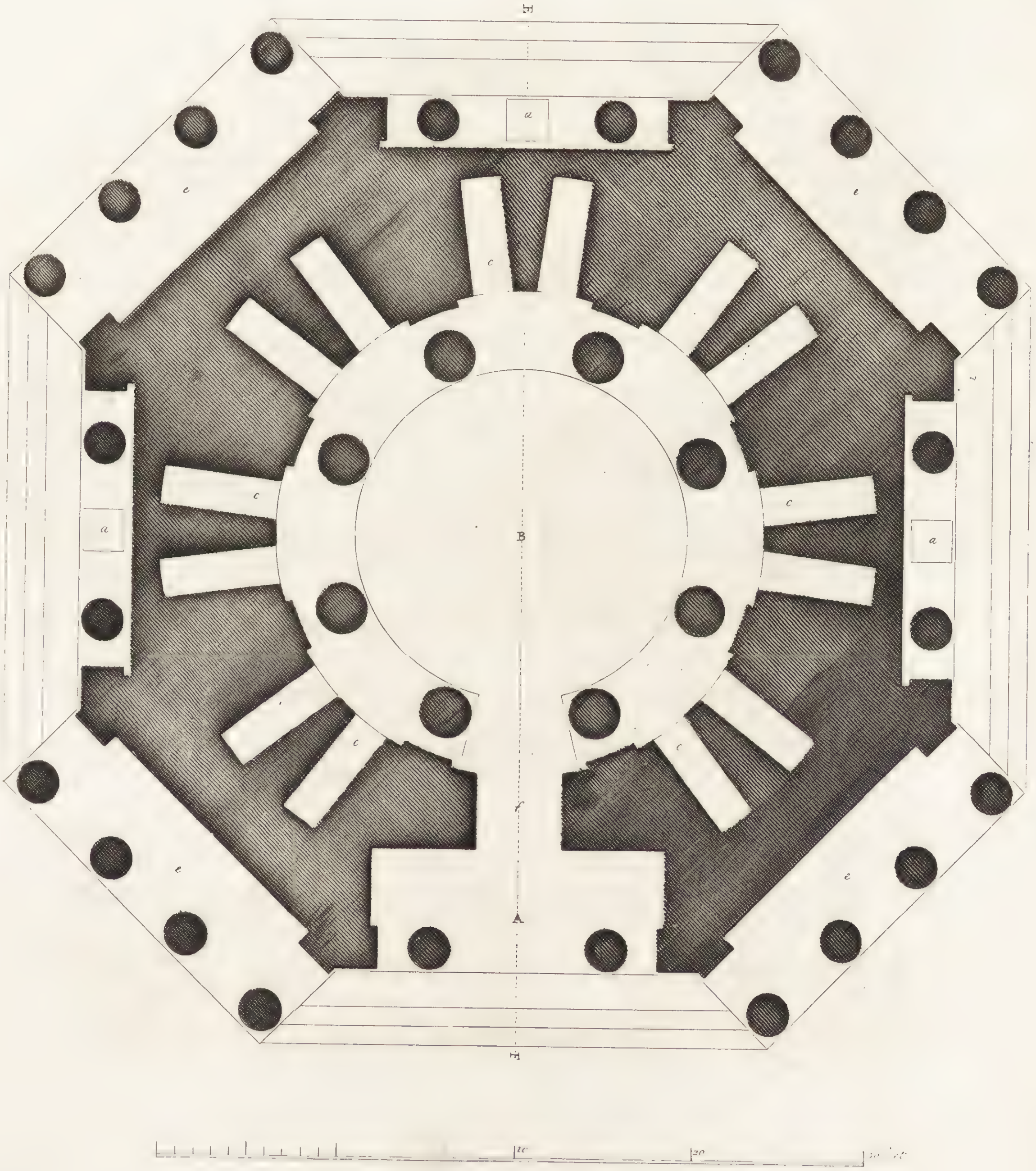
London, Published by Thos. Kelly, 17 Paternoster Row March 6. 1848

TRANSVERSE SECTION OF A CHAPEL.

Designed & Drawn by M. A. Nicholson. *Engraved by A. Dick.*

London. Published by Thos. Kelly, 17 Paternoster Row Augst. 7th 1848.

PLAN OF A MAUSOLEUM.

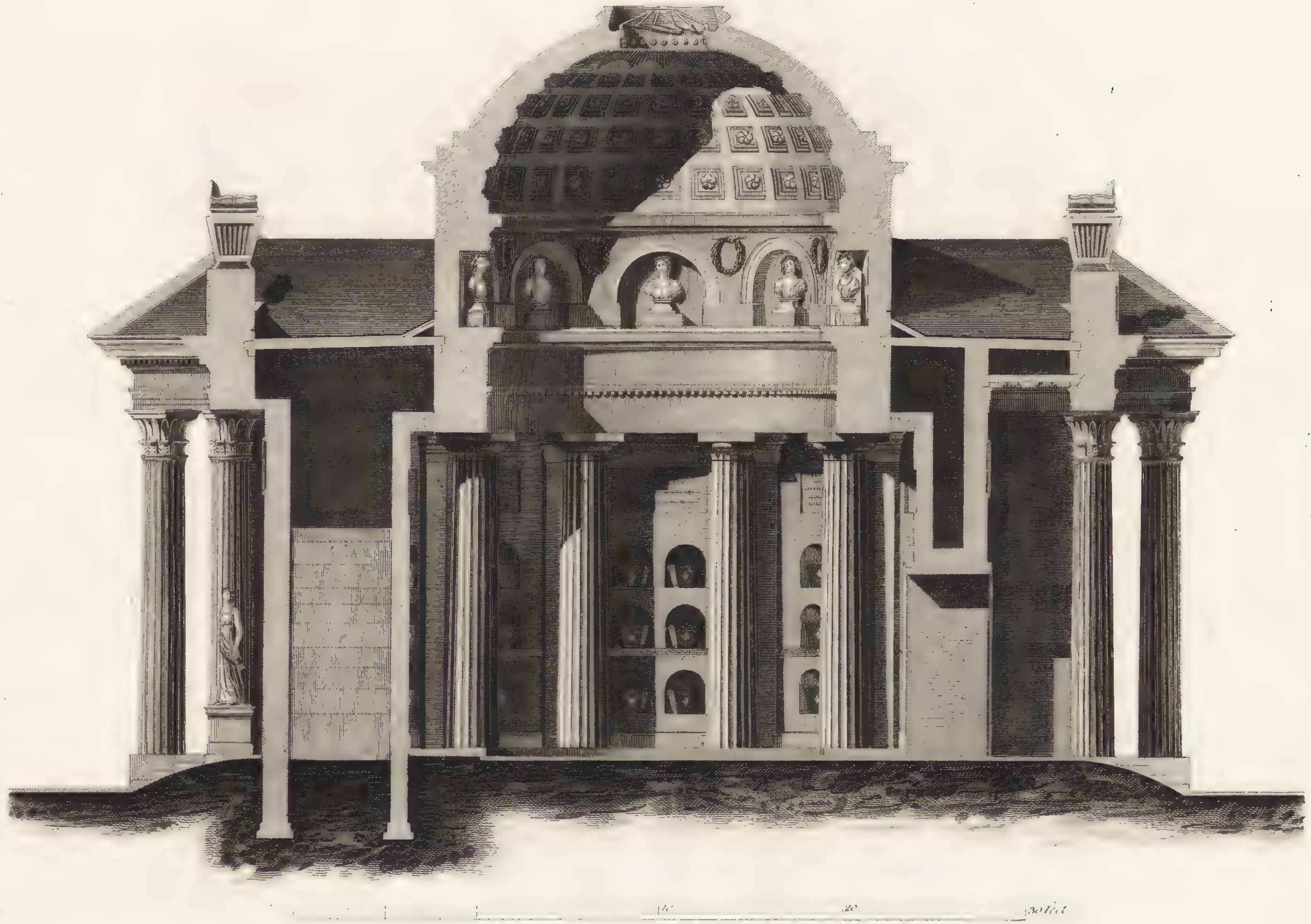


Drawn by M.A. Nicholson

London, Published … May … 1818

ELEVATION OF A MAUSOLEUM.

SECTION OF A MAUSOLEUM.

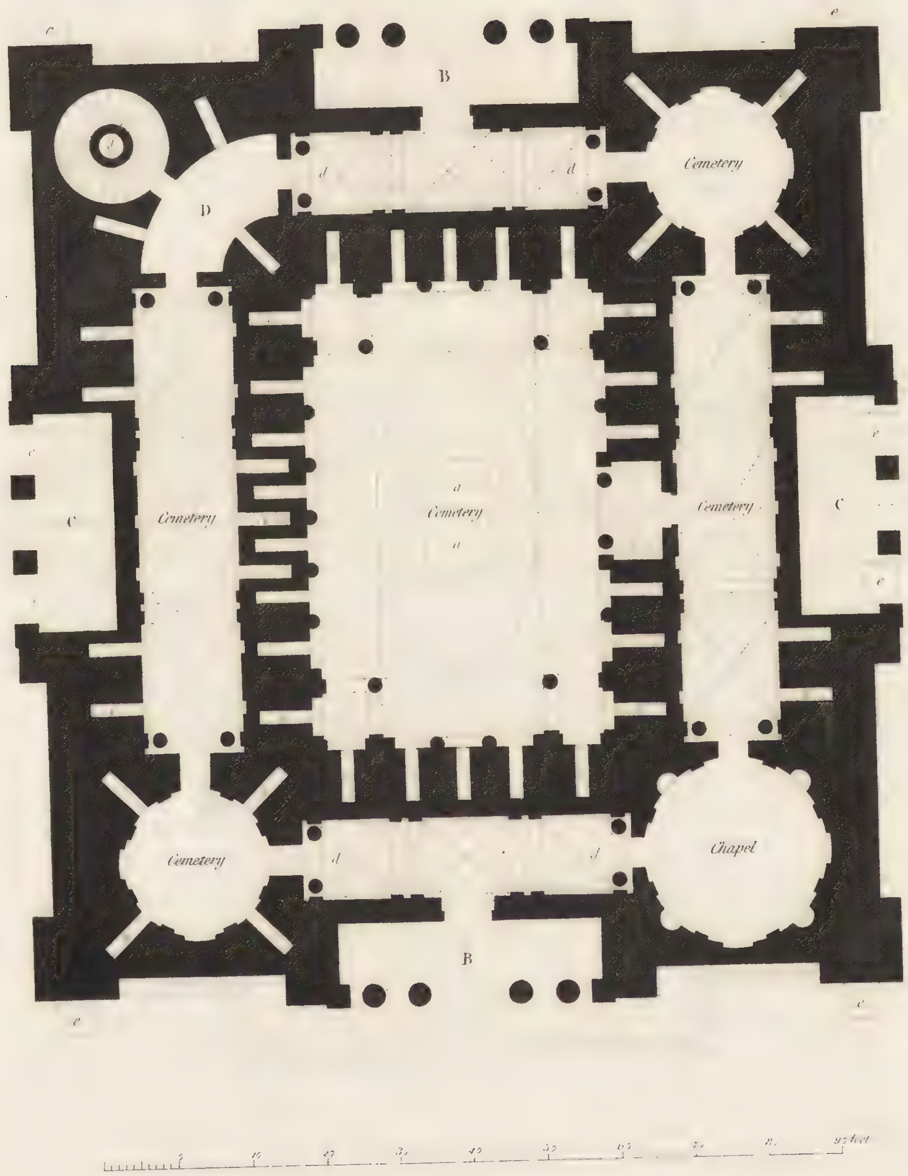


Designed & Drawn by M. A. Nicholson

Engraved by A. Dick.

London. Published by Thos. Kelly, 17 Paternoster Row. July 10 1848

GROUND PLAN OF A MAUSOLEUM: P

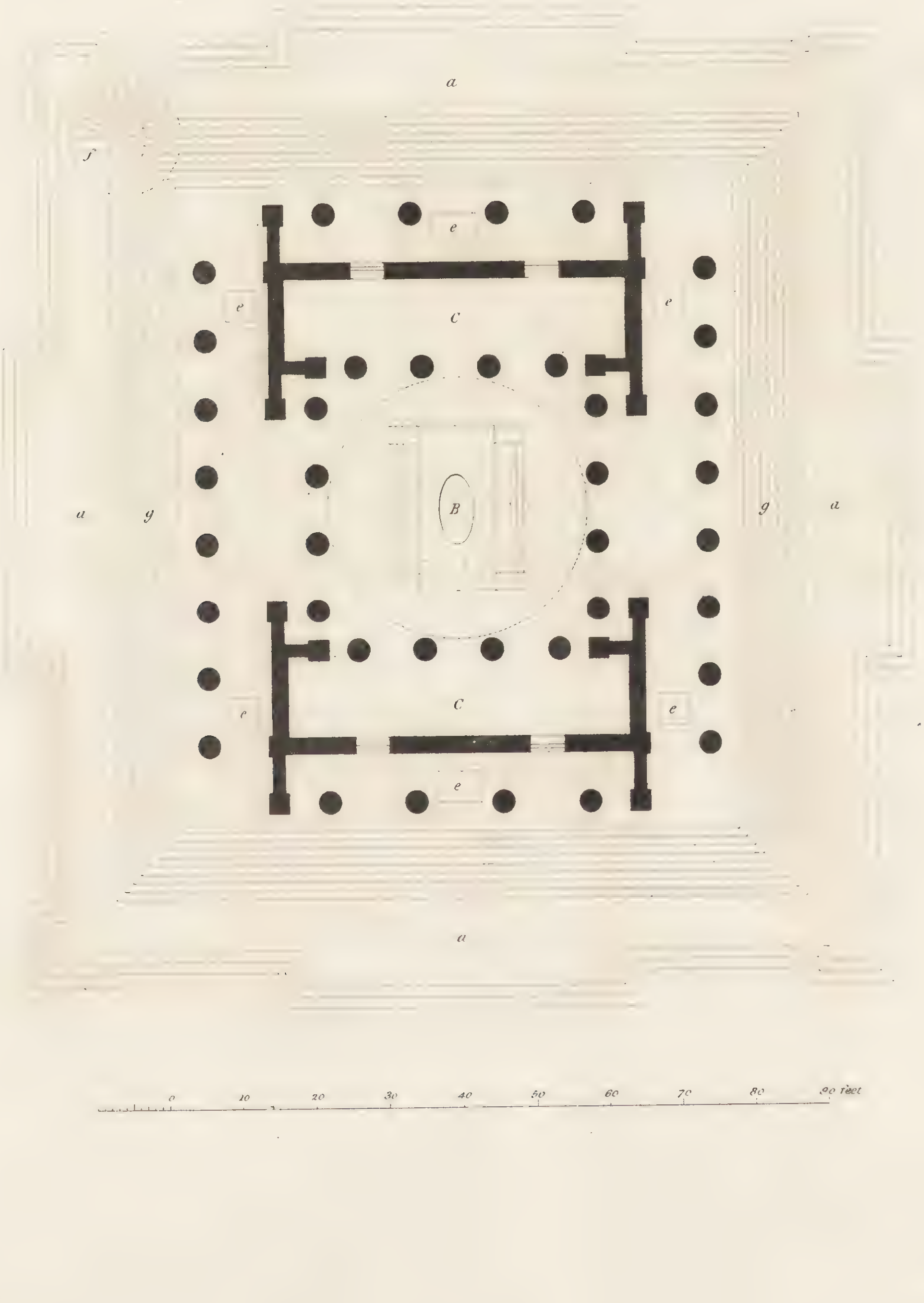


Drawn by M. A. Nicholson

Engraved by Edw.d Kennion

London Published by Tho.s Kelly 17 Paternoster Row

UPPER PLAN OF MAUSOLEUM. P.



Designed &c by M A Nicholson

Engraved by Edw^d Kennion

London, Published by Tho^s Kelly 17 Paternoster Row

FRONT ELEVATION OF MAUSOLEUM, P.

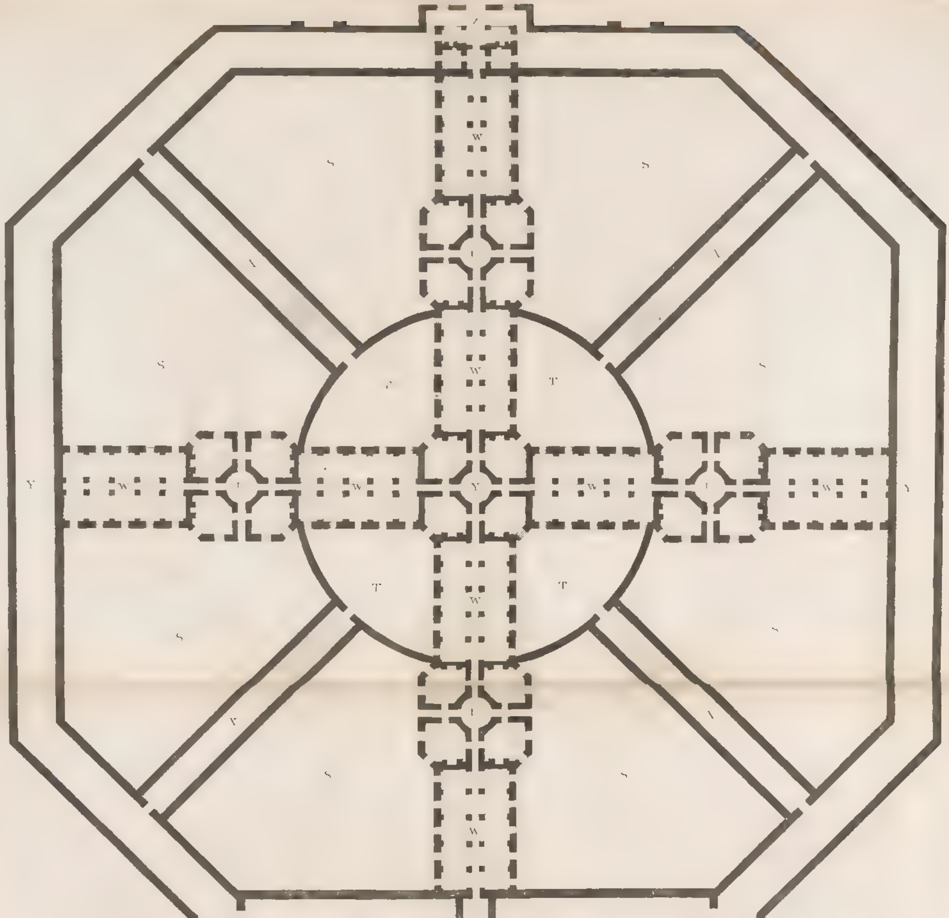
London Published by Thos. Kelly, 17 Paternoster Row May 8th 1848.

FLANK ELEVATION OF MAUSOLEUM .Nº.

[illegible] by M.A. Nicholson

Engraved [illegible]

London, Published by Thos. Kelly, 17 Paternoster Row [illegible]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Back of
Foldout
Not Imaged

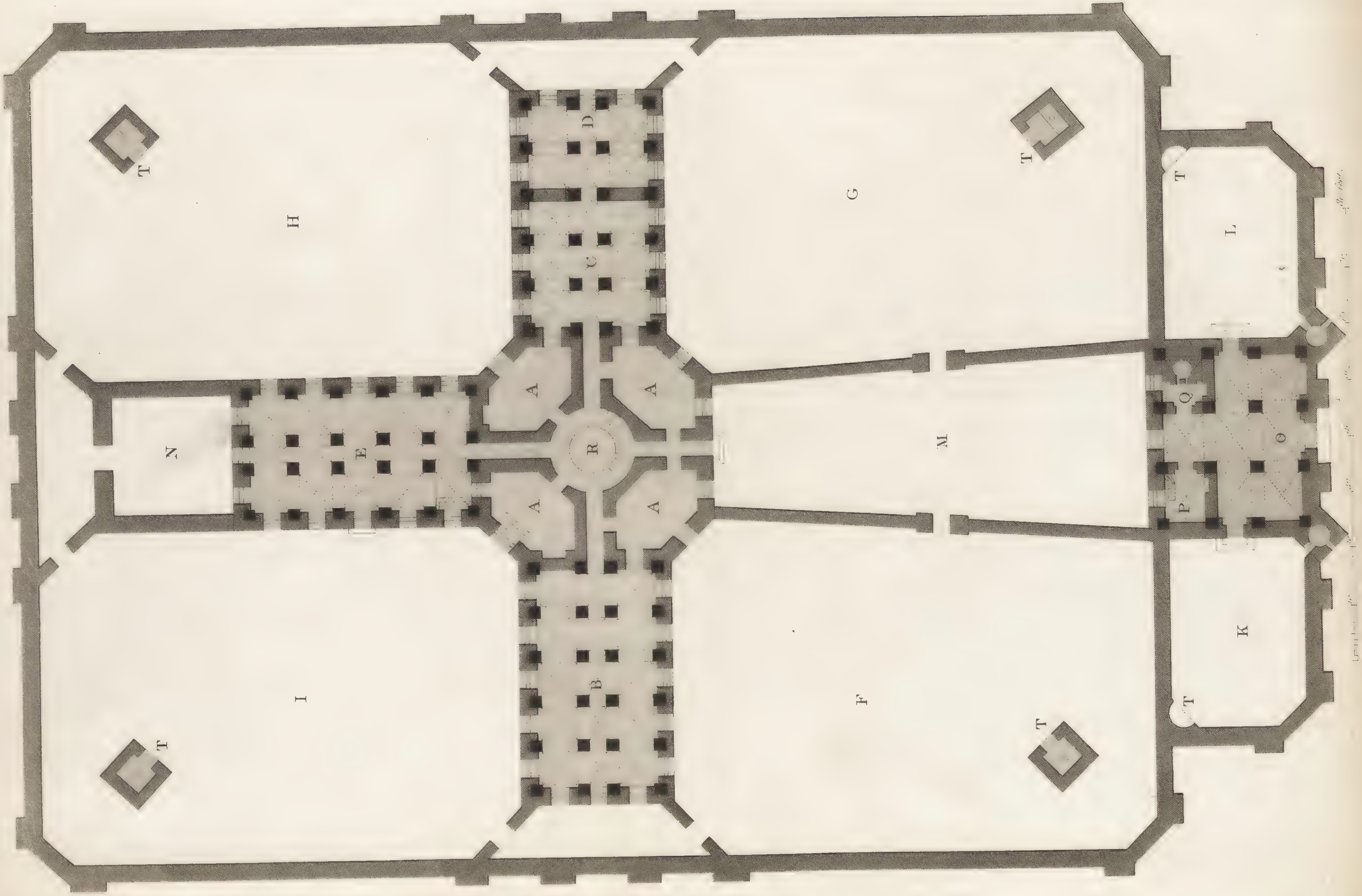
DESIGN FOR [illegible] COURT HOUSE AND PRISONS.

Back of
Foldout
Not Imaged

GROUND PLAN

of a small County Prison.

PLATE LXIV.



Designed by R. Elsam Arch^t.

Adlard sculp^t.

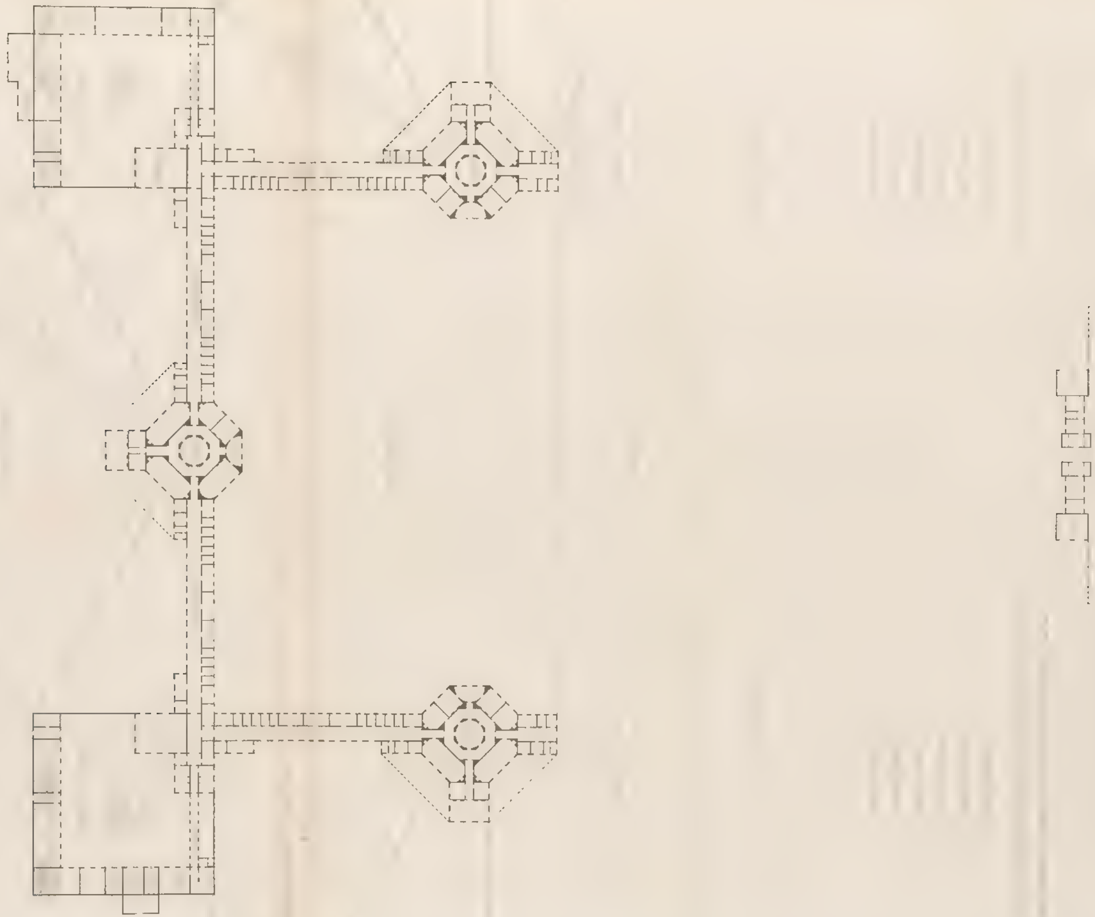
ELEVATION

of a small County Prison.

Designed by R. Elsam Archt.

sculp.

London Published by Thos. Kelly 17, Paternoster Row, June 1st 1818



Back of
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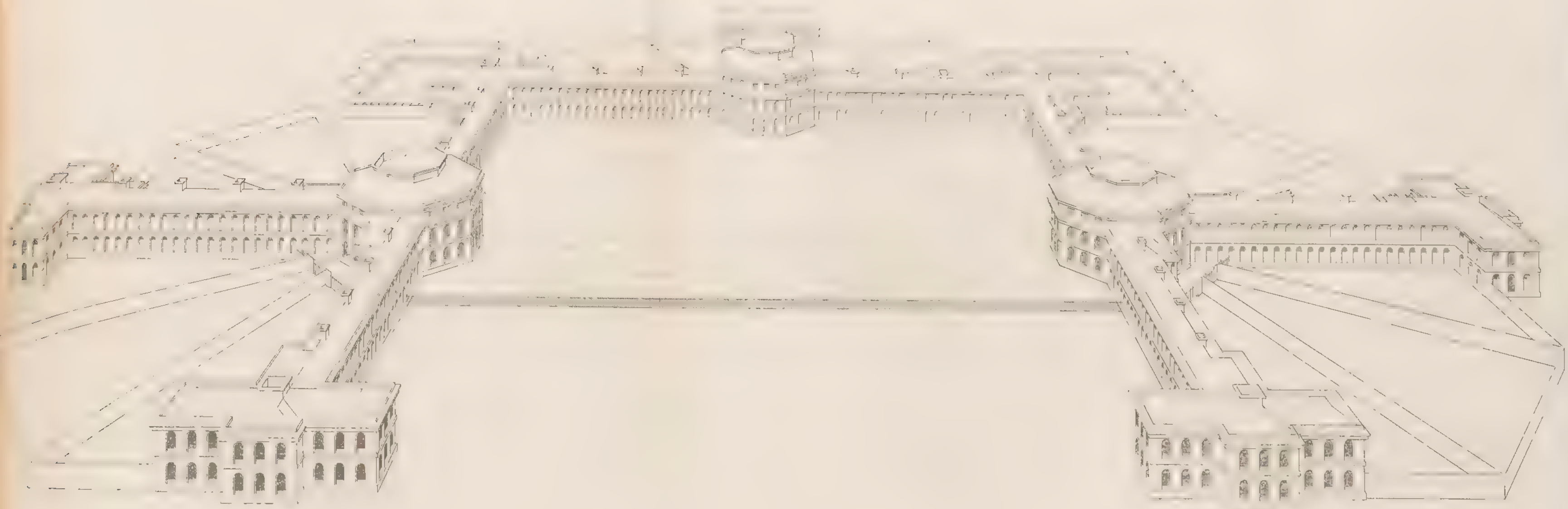
PERSPECTIVE OR BIRDS EYE VIEW OF THE MIDDLESEX COUNTY LUNATIC ASYLUM.



Back of
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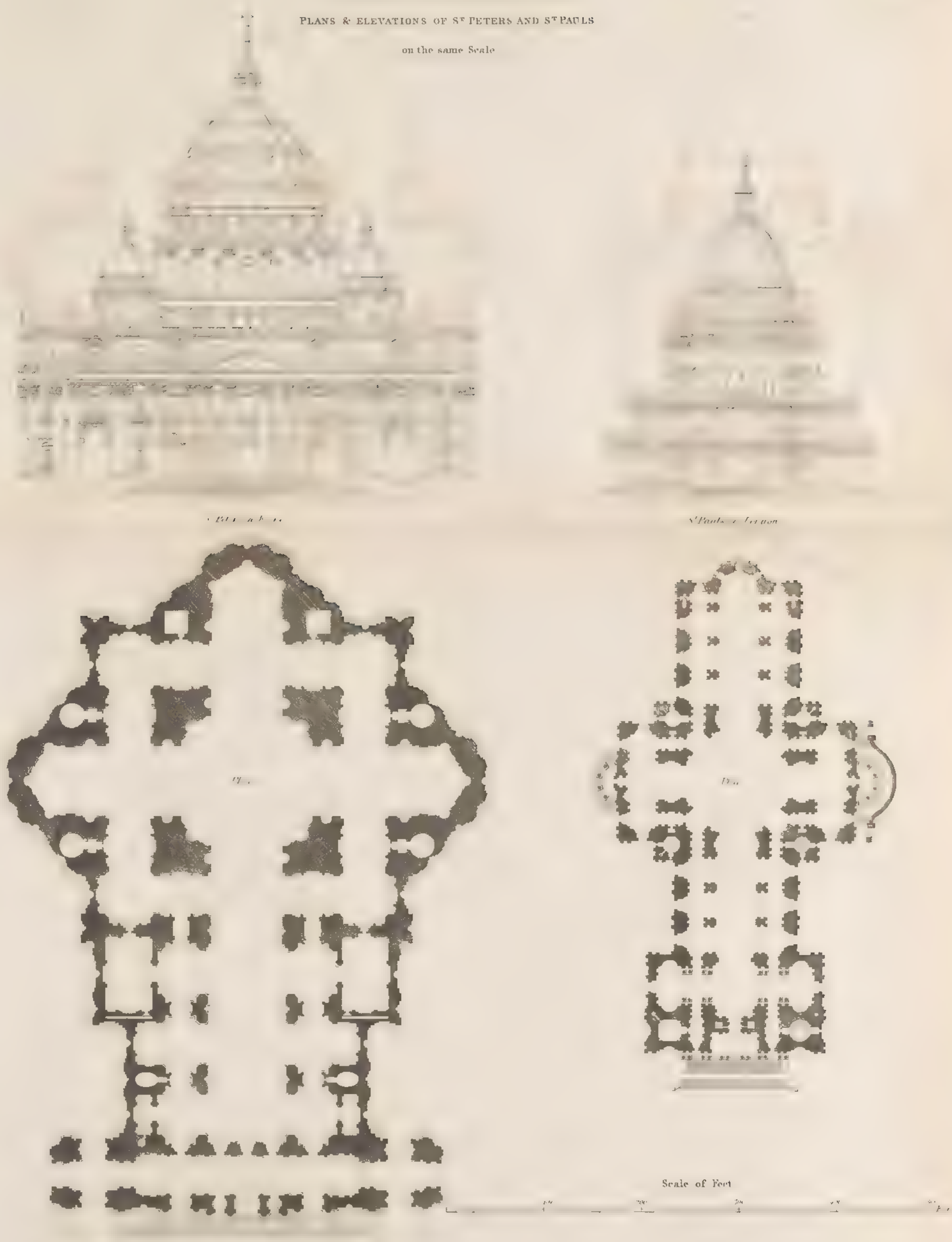
ROMAN ARCHITECTURE.

PLANS & ELEVATIONS OF S^T^ PETERS AND S^T^ PAULS

on the same Scale



London Published by Thos Kelly 17 Paternoster Row [illegible]

Back of Foldout Not Imaged

GEOMETRY.

THE PLANE SCALES &c.

Figure 1. Protractor or Semi circle.

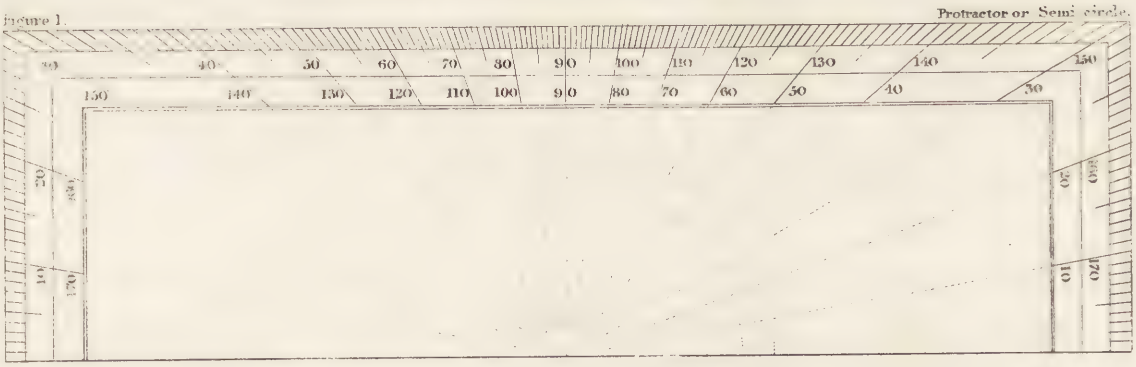


Figure 2. Equal Parts and Decimal Diagonal Scale.

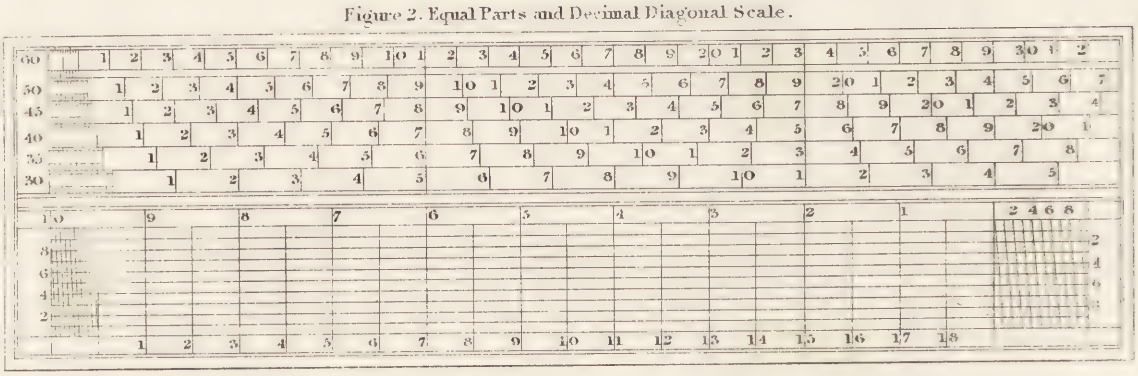


Fig. 3. Chords. Equal Parts for Feet and Inches.

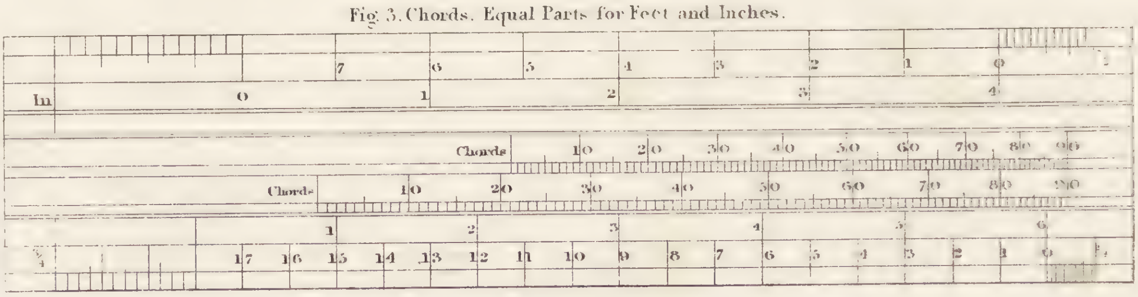
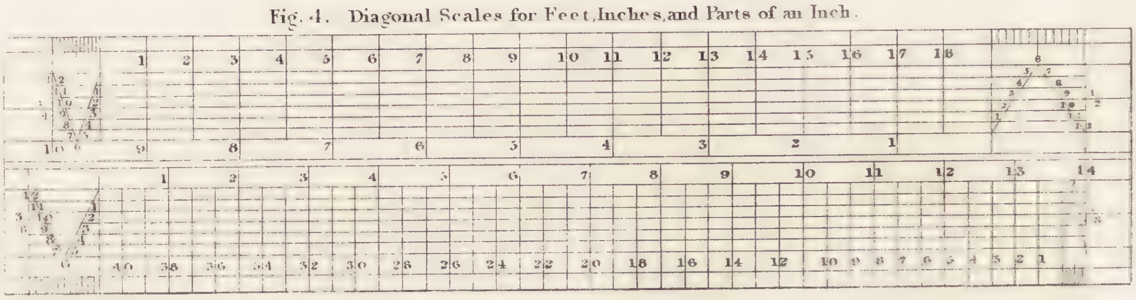


Fig. 4. Diagonal Scales for Feet, Inches, and Parts of an Inch.



London. Published by Thos Kelly 17 Paternoster Row Feb. 2 1842

Fig. 1.

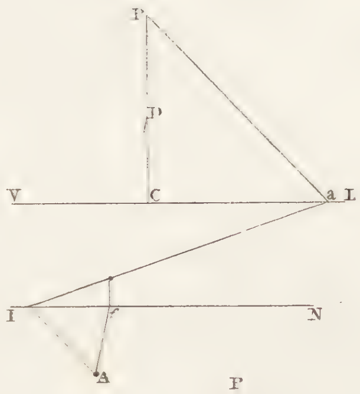


Fig. 2.

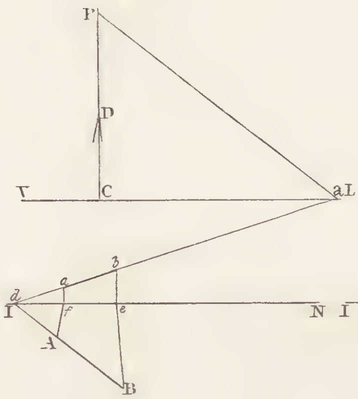
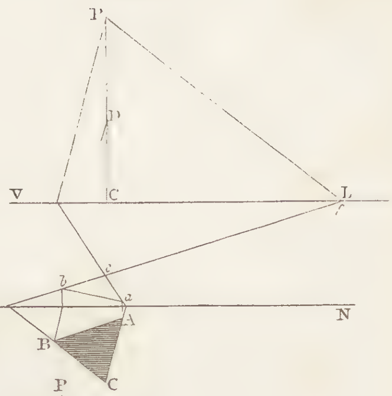


Fig. 3.



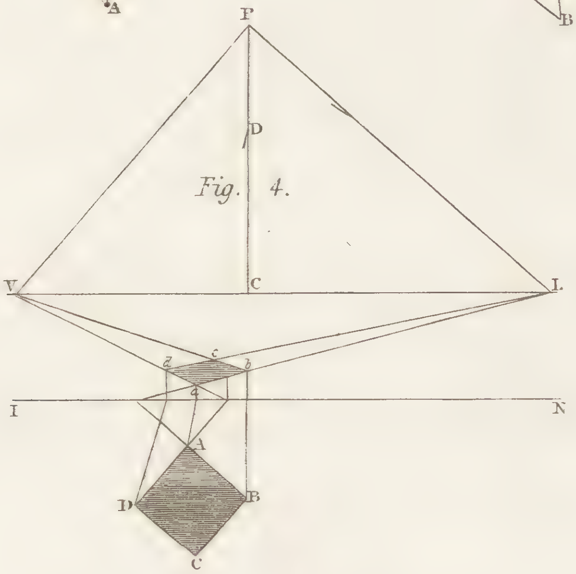


Fig. 4.

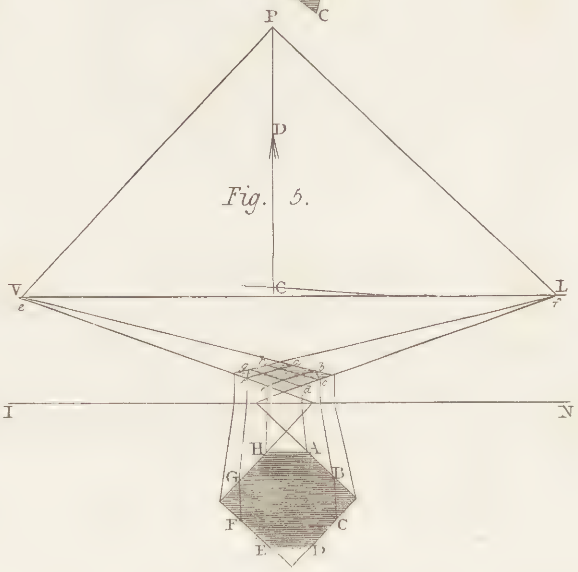


Fig. 5.

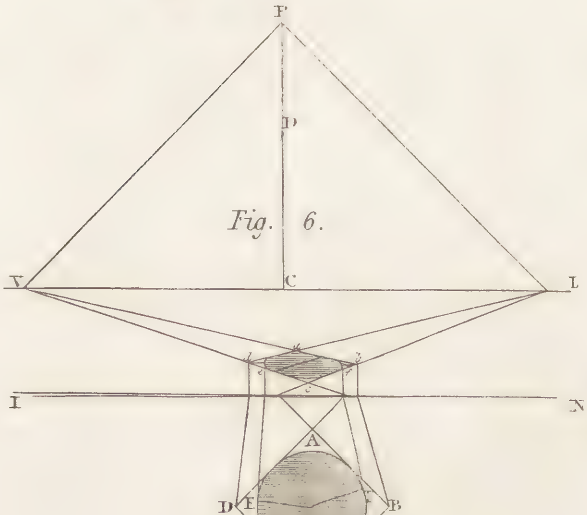


Fig. 6.

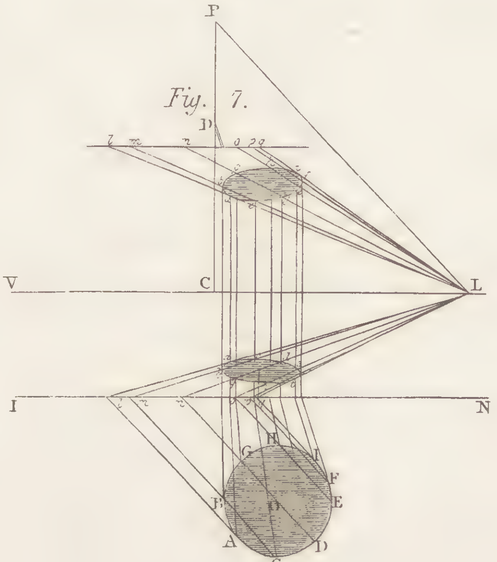


Fig. 7.

Drawn by M. A. Nicholson

Engraved by W. Symes

London Published by Thos. Kelly, 17 Paternoster Row

PERSPECTIVE.

Fig. 1.

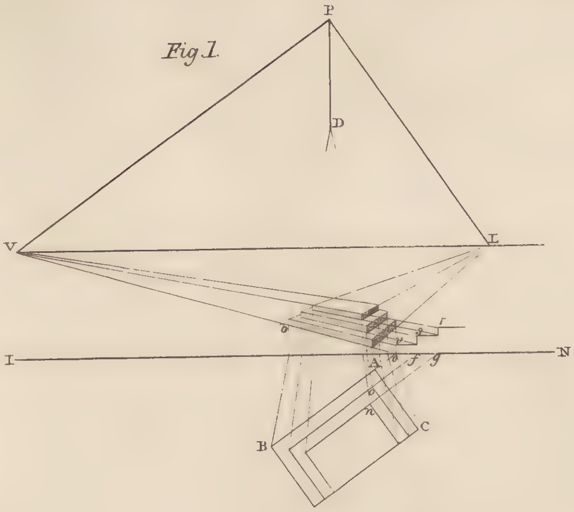


Fig. 2.

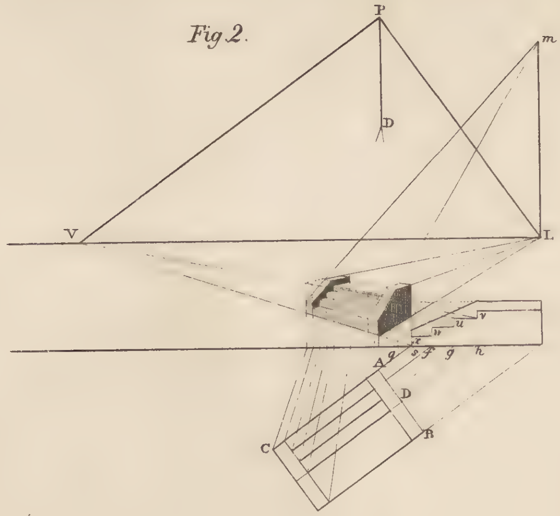


Fig. 3.

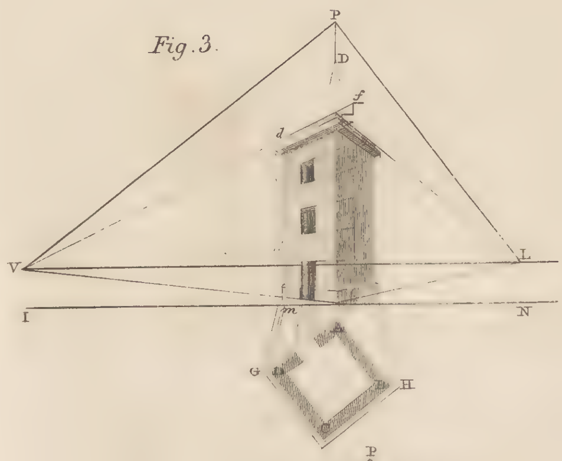


Fig. 4.

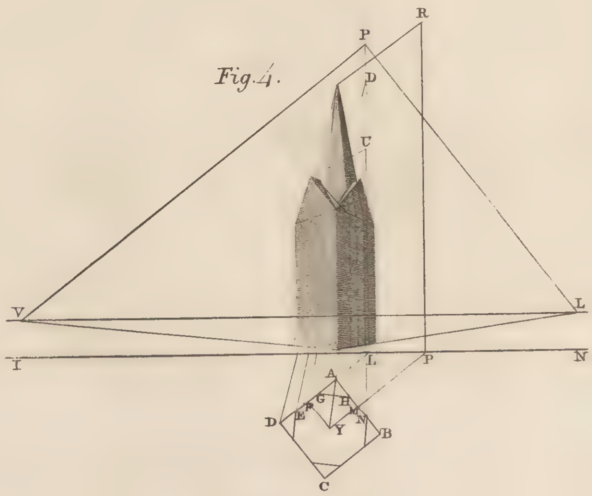


Fig. 5.

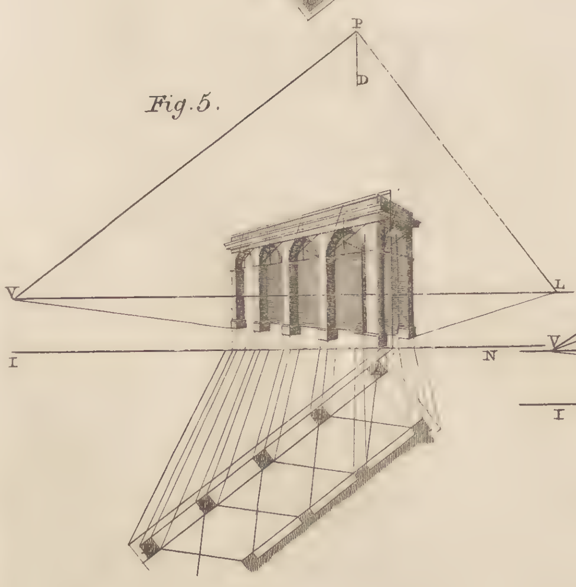
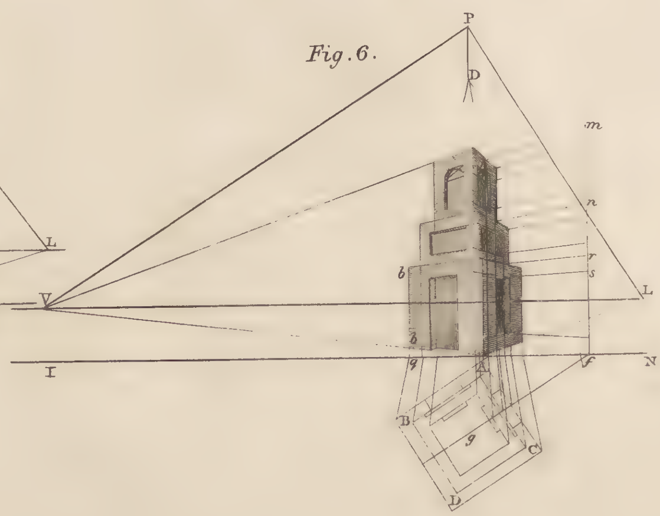


Fig. 6.



M.A. Nicholson.

Engraved by W. Symn

London, Published by Thos. Kelly 17 Paternoster Row. Sept. 20 1836

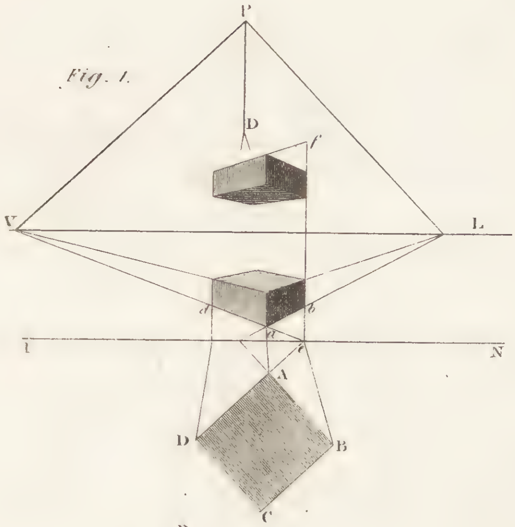
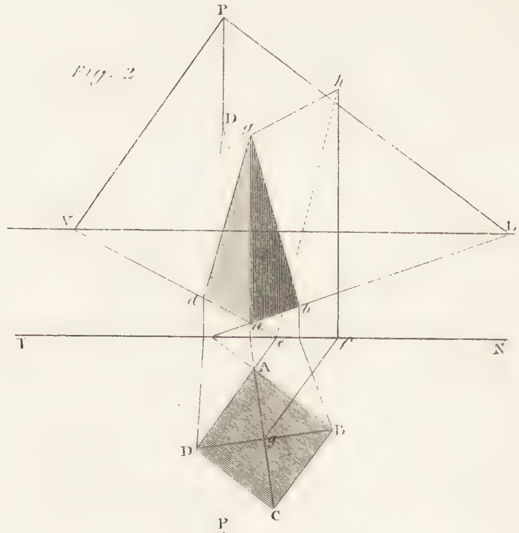


Fig. 1.



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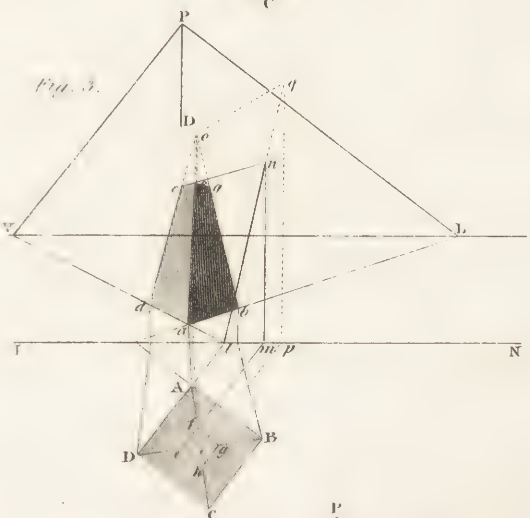

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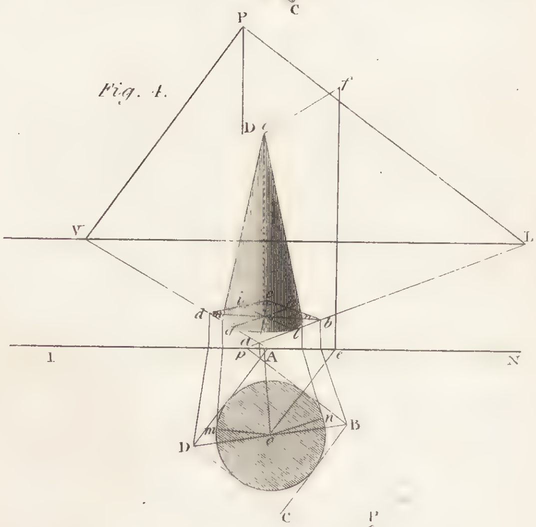

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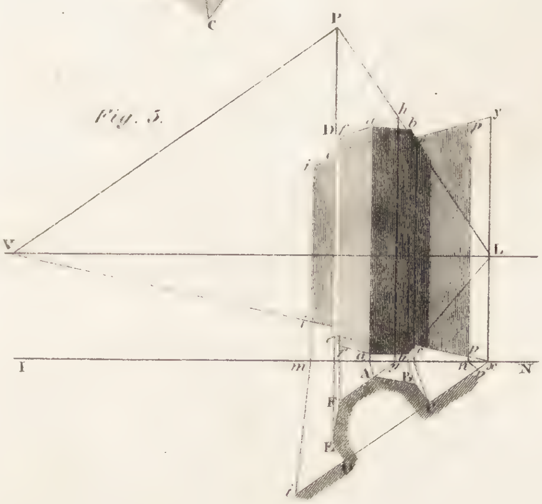

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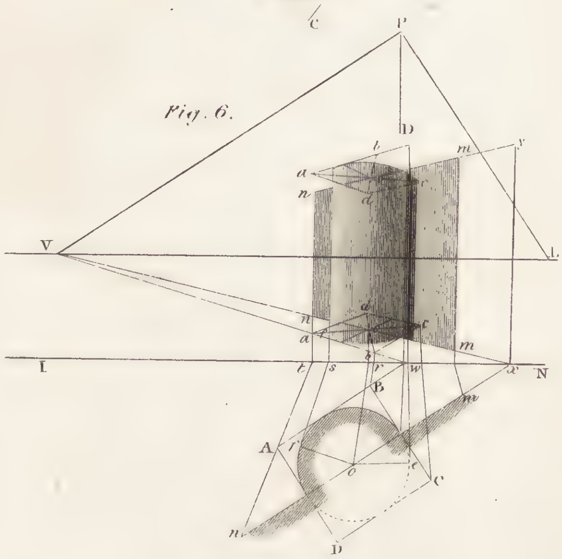


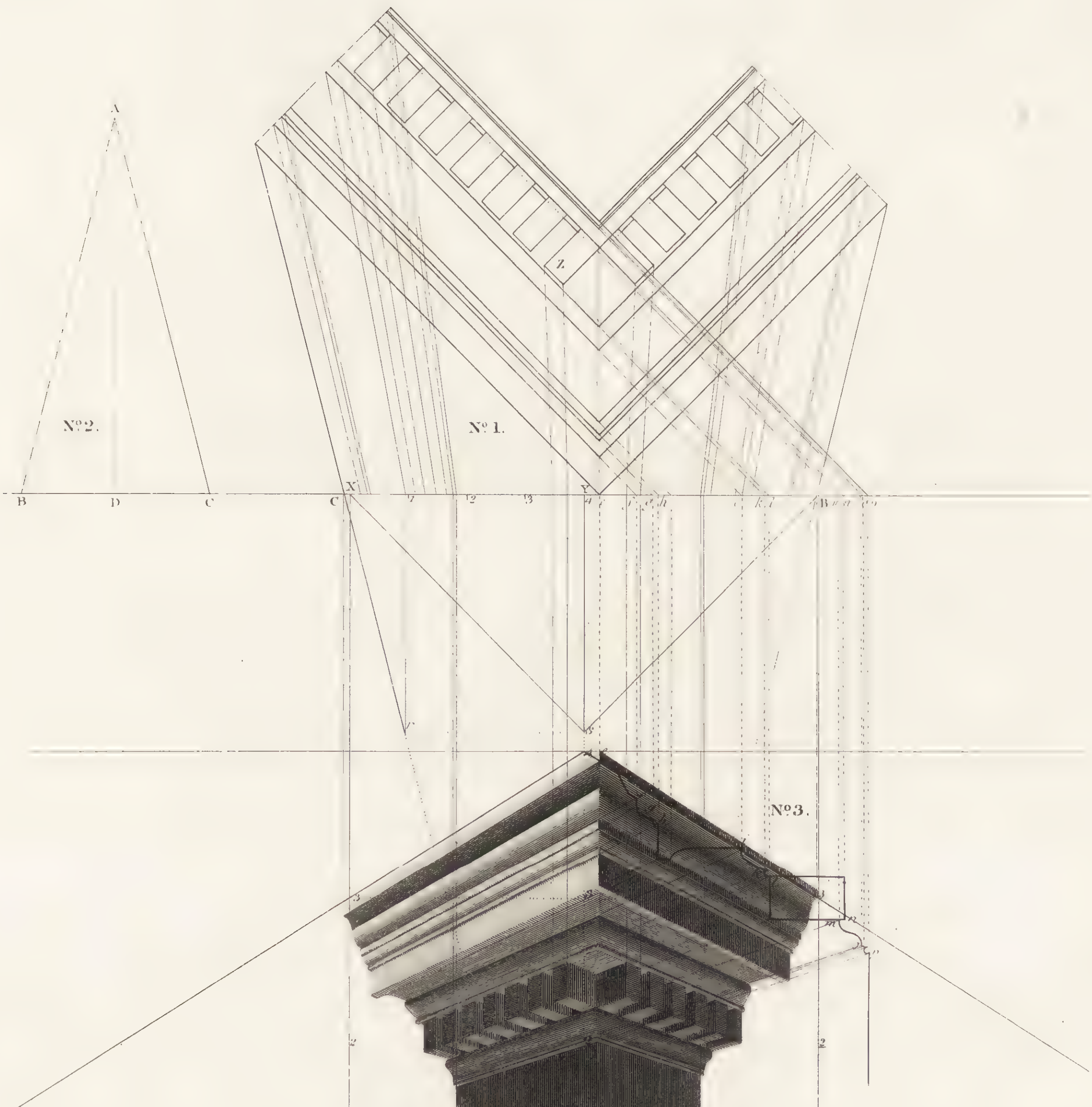
Fig. 6.

Drawn by M.A. Nicholson

Engraved by

London, Published by Thos. Kelly, 17 Paternoster Row, March 25, 1843.

PERSPECTIVE.



London, Published by Thos. Kelly, 17 Paternoster Row, Sept. 5, 1818.

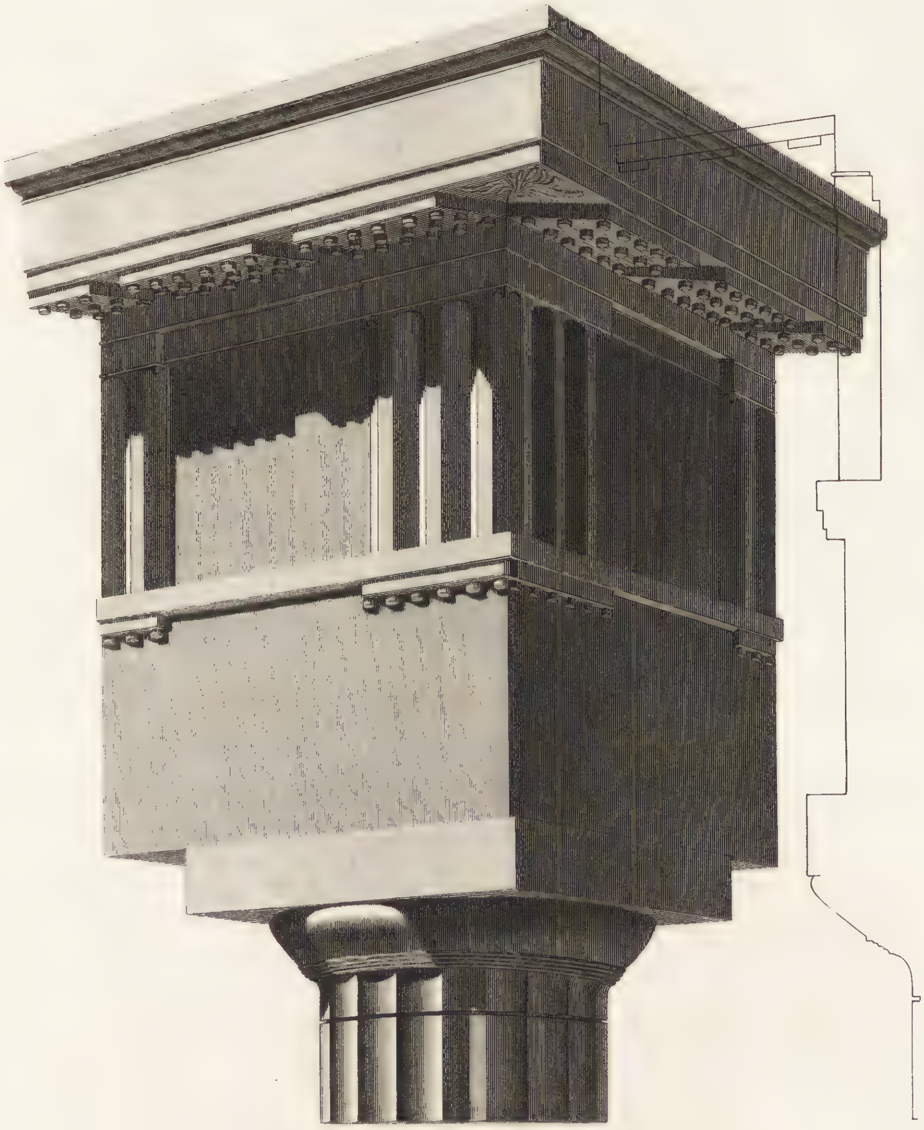
Drawn by M. A. Nicholson.

Engraved by H. Adlard

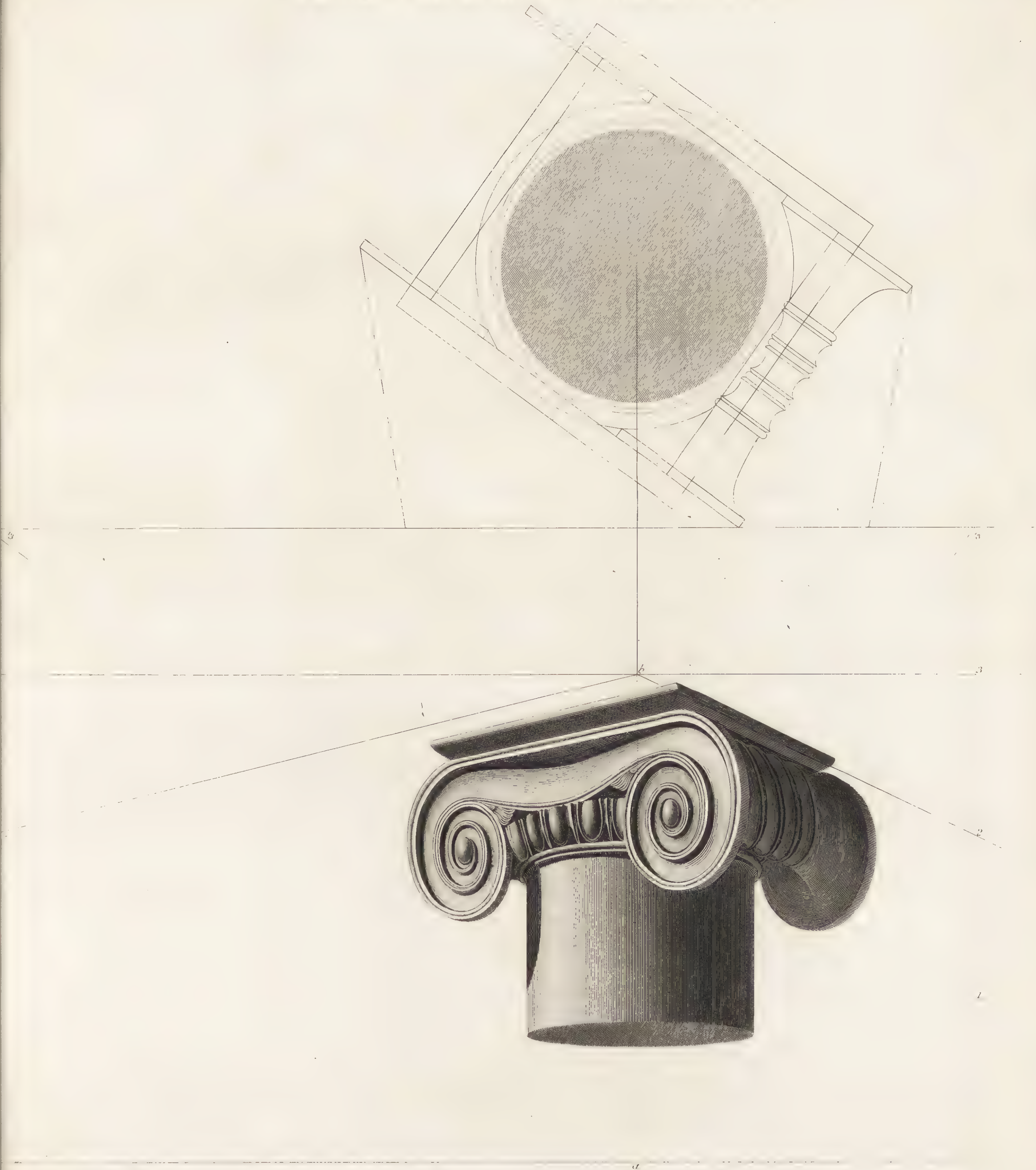
London. Published by Thos Kelly 17 Paternoster Row. Augt 2d 1848.

PERSPECTIVE

GRECIAN DORIC



IONIC CAPITAL IN PERSPECTIVE.

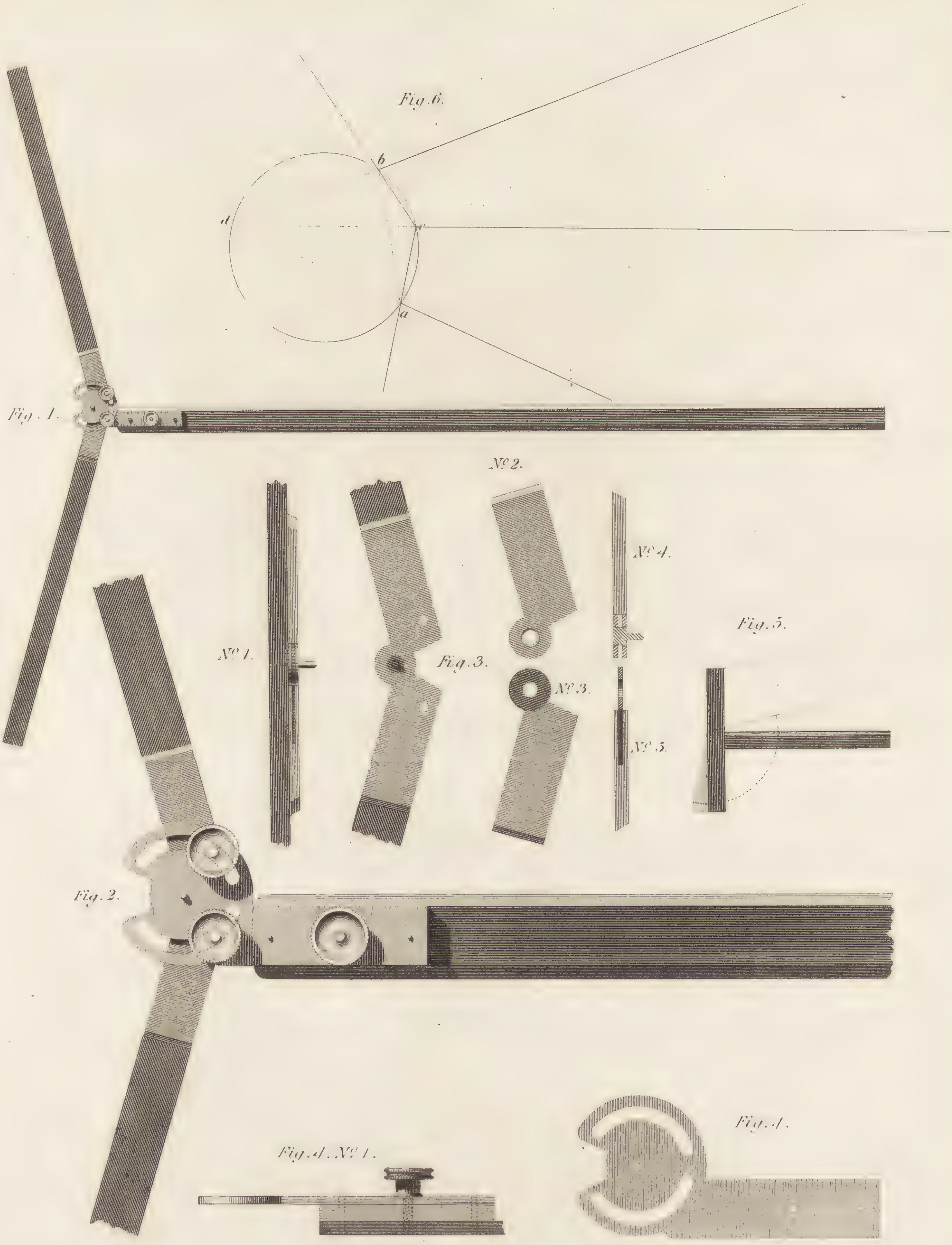


CORINTHIAN ORDER IN PERSPECTIVE,

FROM THE TEMPLE OF JUPITOR STATOR AT ROME.

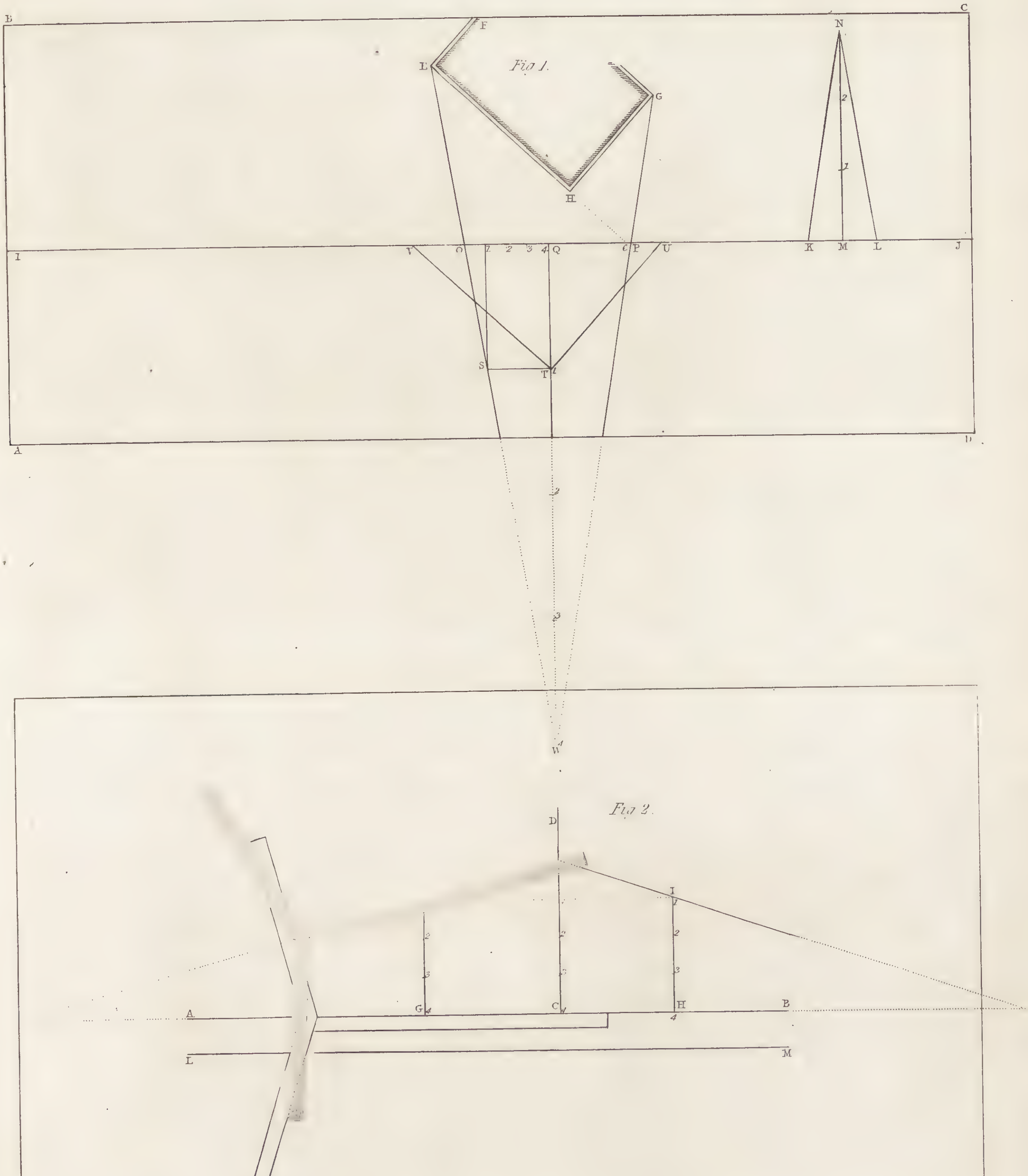
Drawn by M.A. Nicholson. *Engraved by J. Le Keux.*

London. Published by Thos. Kelly. 17 Paternoster Row Jany. 15. 1848.



London, Published by Thos. Kelly, 17 Paternoster Row Octr. 18. 1848

MODE OF SETTING THE CENTROLINEAD.



Drawn by M. A. Nicholson.

Engraved by A. Dick.

London, Published by Thos. Kelly, 17 Paternoster Row, April 10 1848.

Fig. 1.

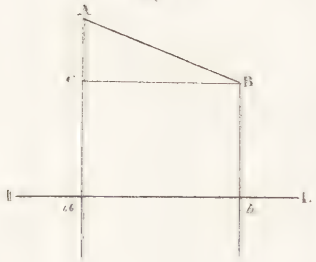


Fig. 2.

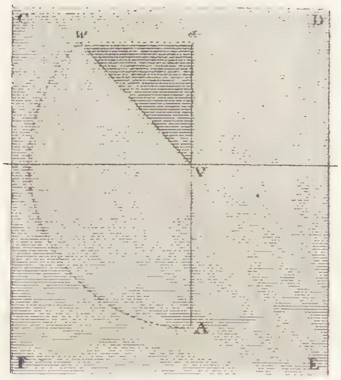
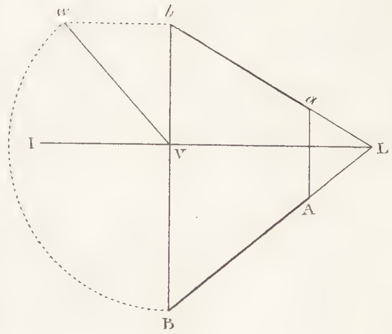


Fig. 3.



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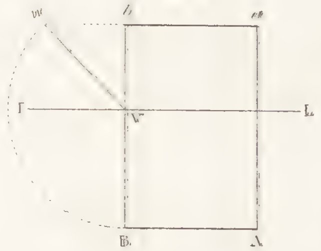


Fig. 5.

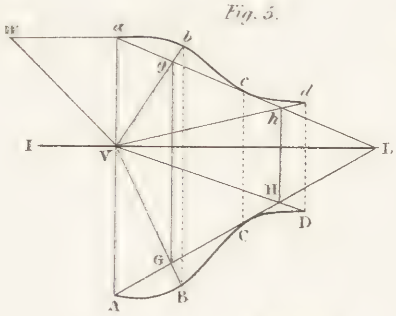
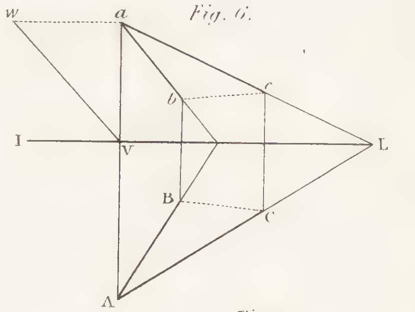


Fig. 6.



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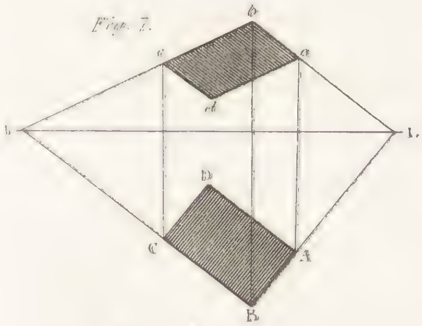

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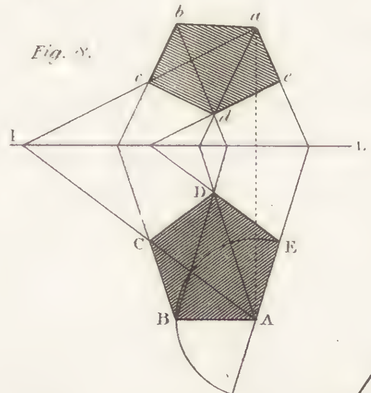

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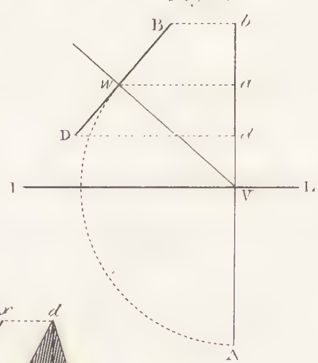
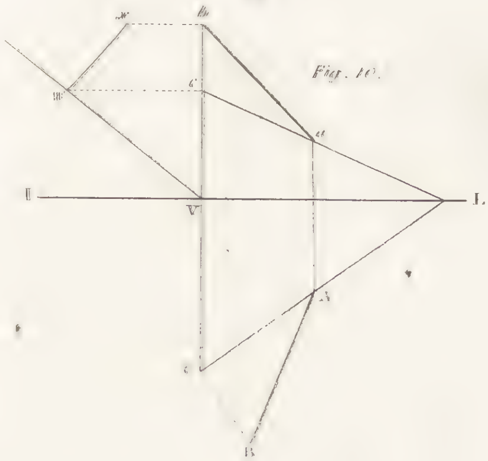


Fig. 10.



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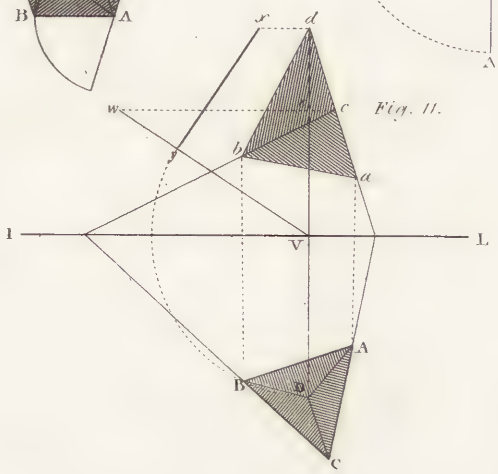
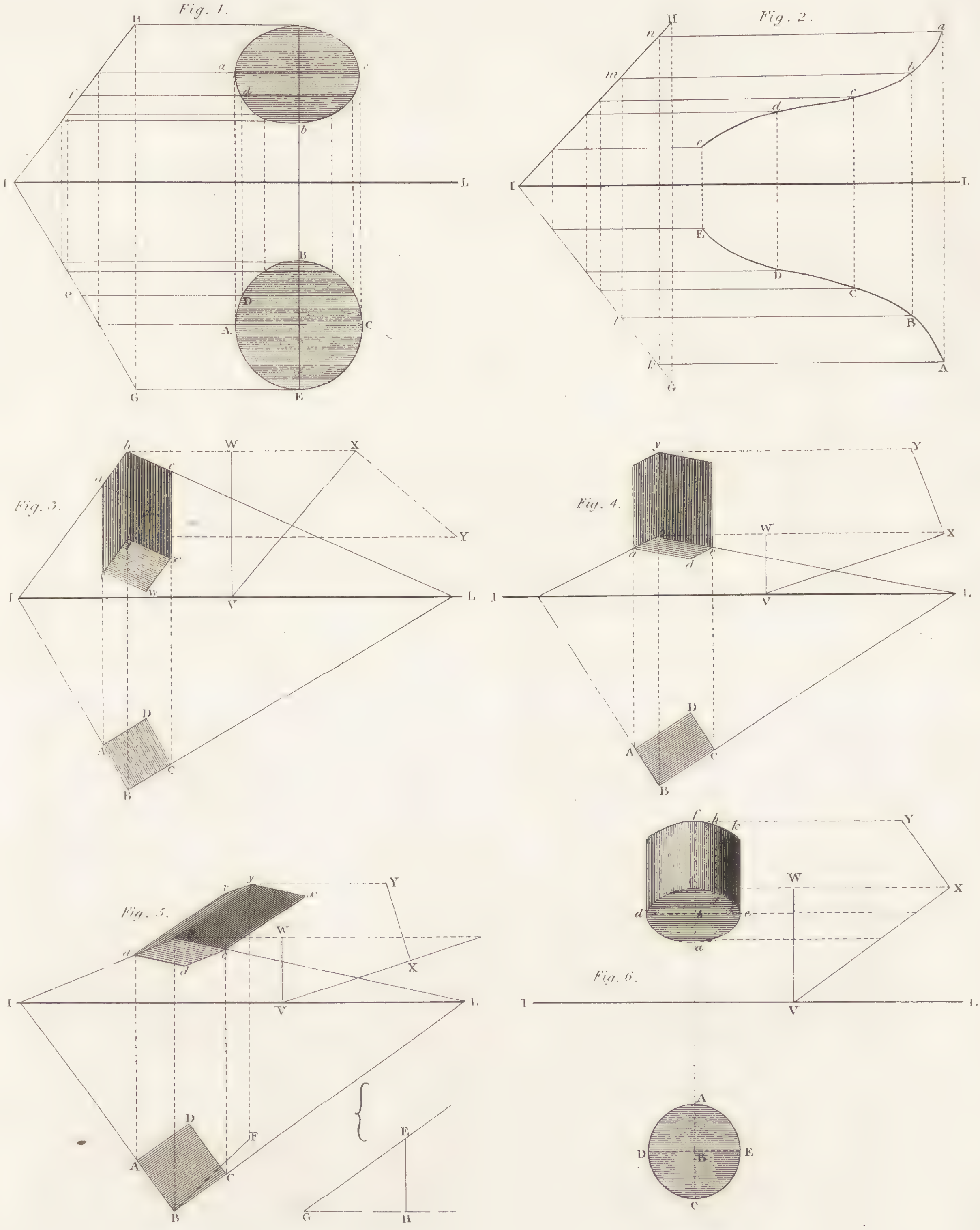




H. Adlard Sculp.

[illegible] March 1818.

Fig. 1.

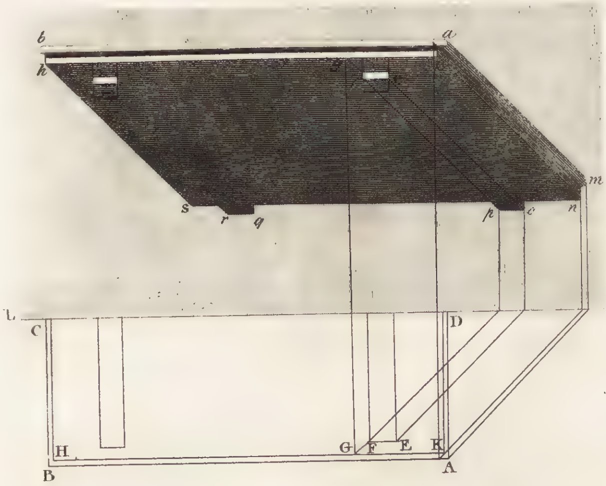


Fig. 2.

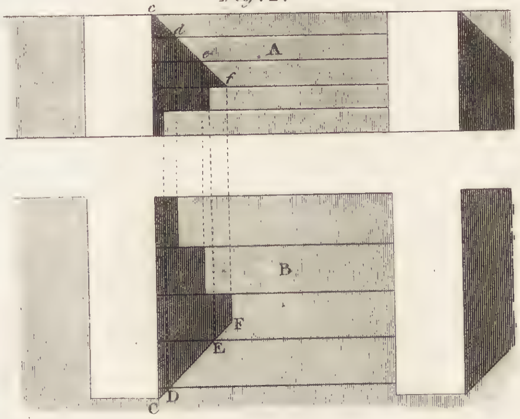
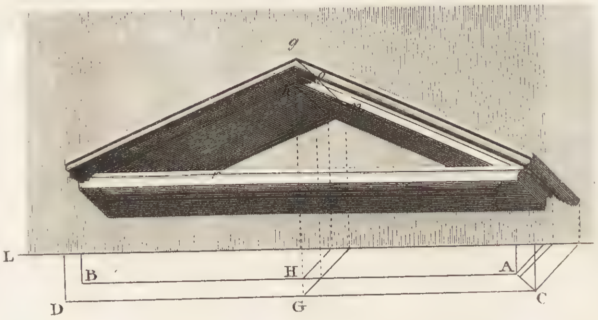


Fig. 3.



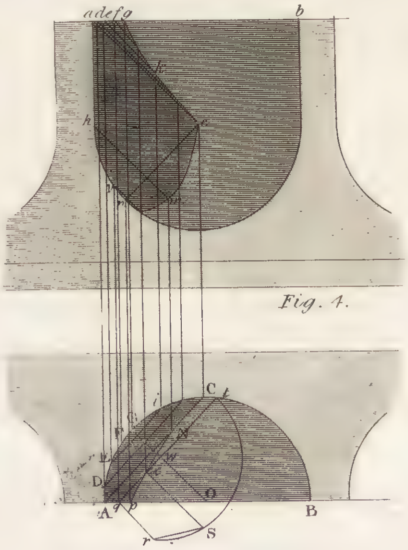


Fig. 4.

Fig. 5.

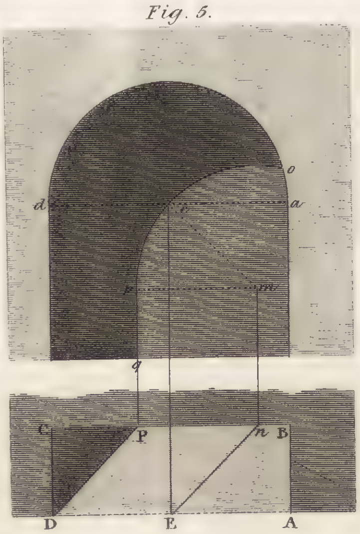
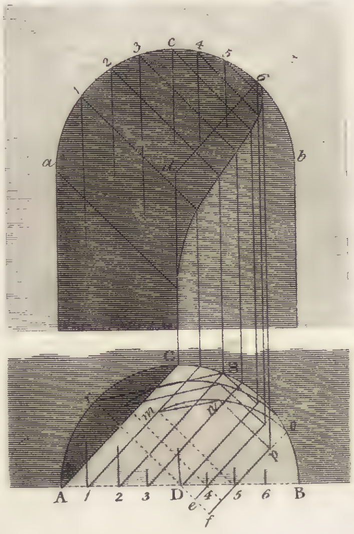


Fig. 6.



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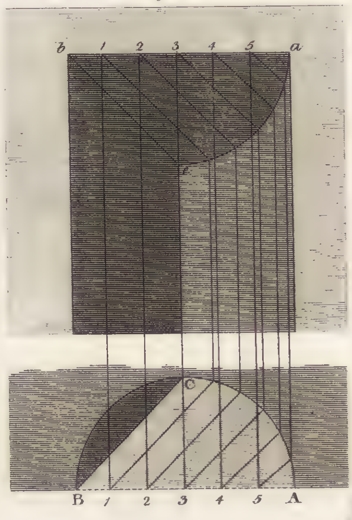


Adlard sc.

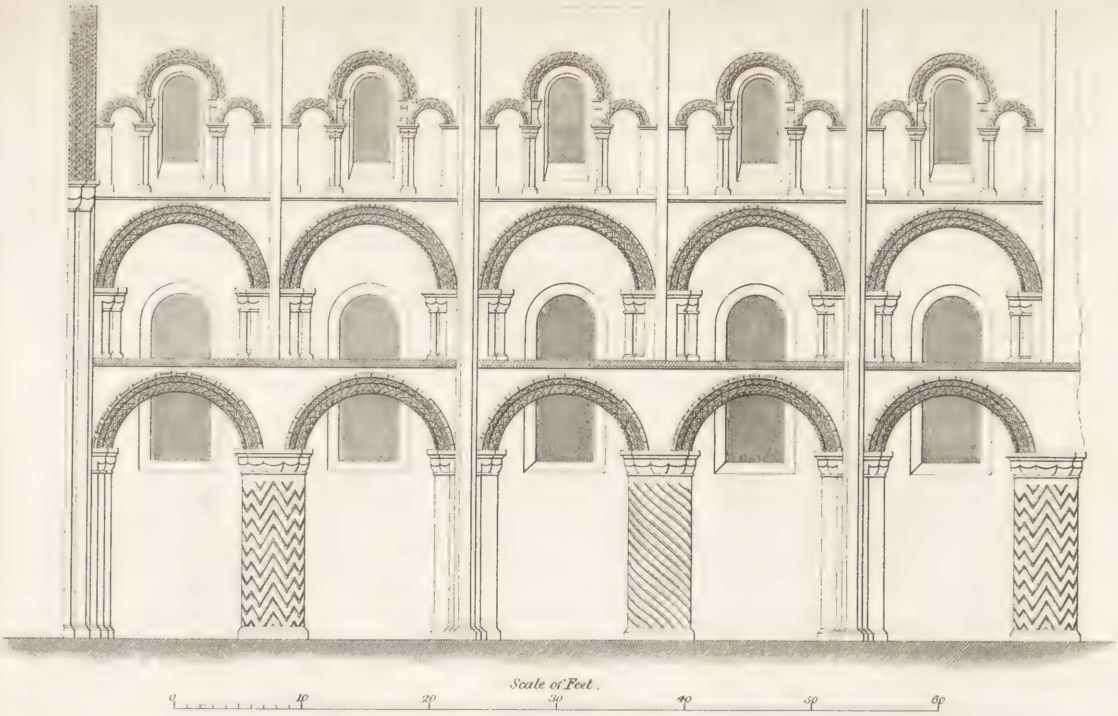
London, Published by Tho.s Kelly, 17, Paternoster Row

Drawn by M. A. Nicholson.

Engraved by W. Symns.

London, Published by Thos. Kelly, 17, Paternoster Row, Sept. 1, 1846.

Section of part of Waltham Abbey, Essex.



Part of the Apsis of the Church of St. Nicholas, at Caen.

Part of the Church called l'Abbaye aux Dames, at Caen in Normandy.

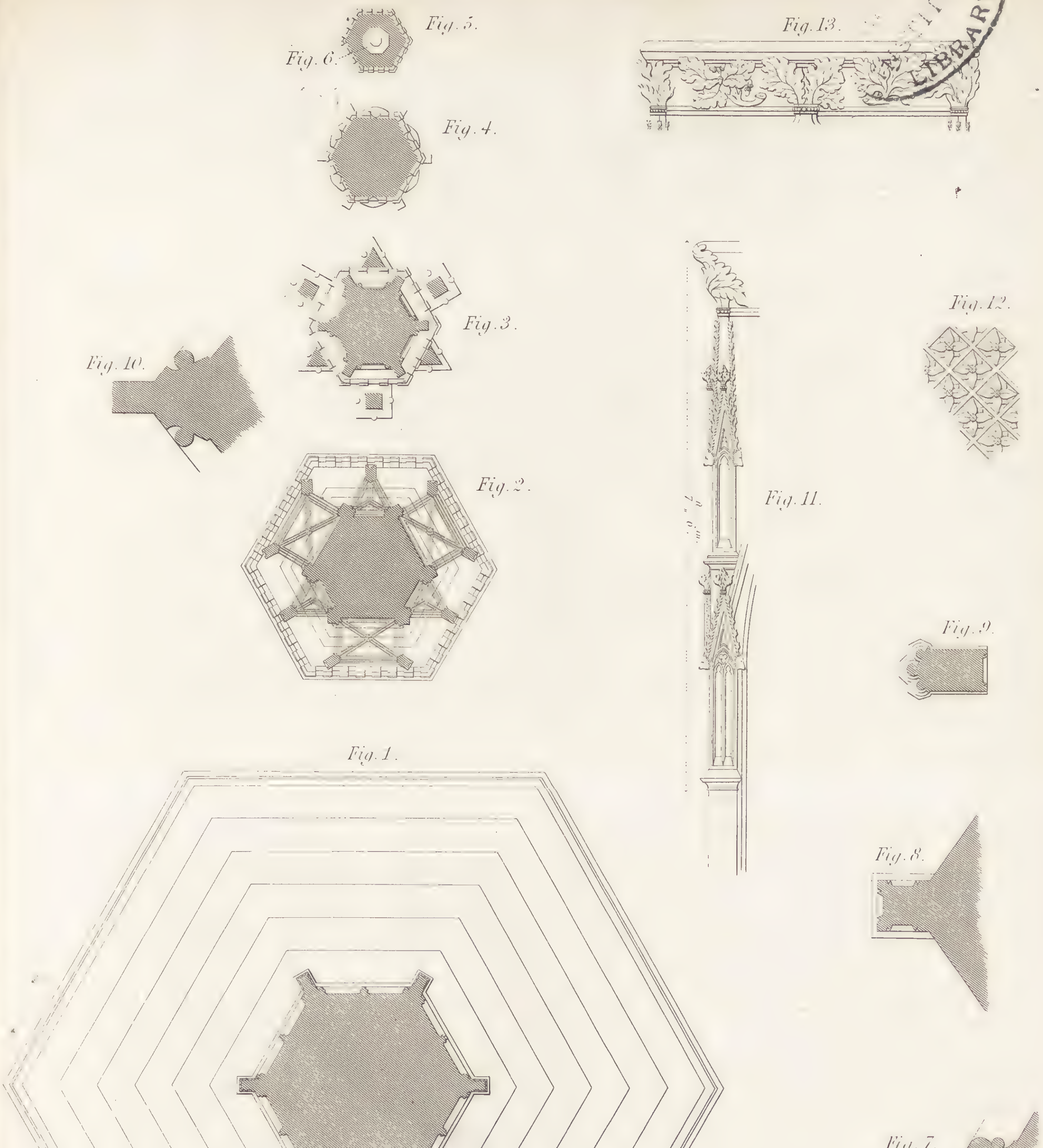
Drawn by W. B. Clarke. Scale of 5 10 15 20 feet. Engraved by E. Turrell.

London. Published by Thos. Kelly 17 Paternoster Row Feby. 1st. 1848.

WALTHAM CROSS. GEOMETRICAL ELEVATION.

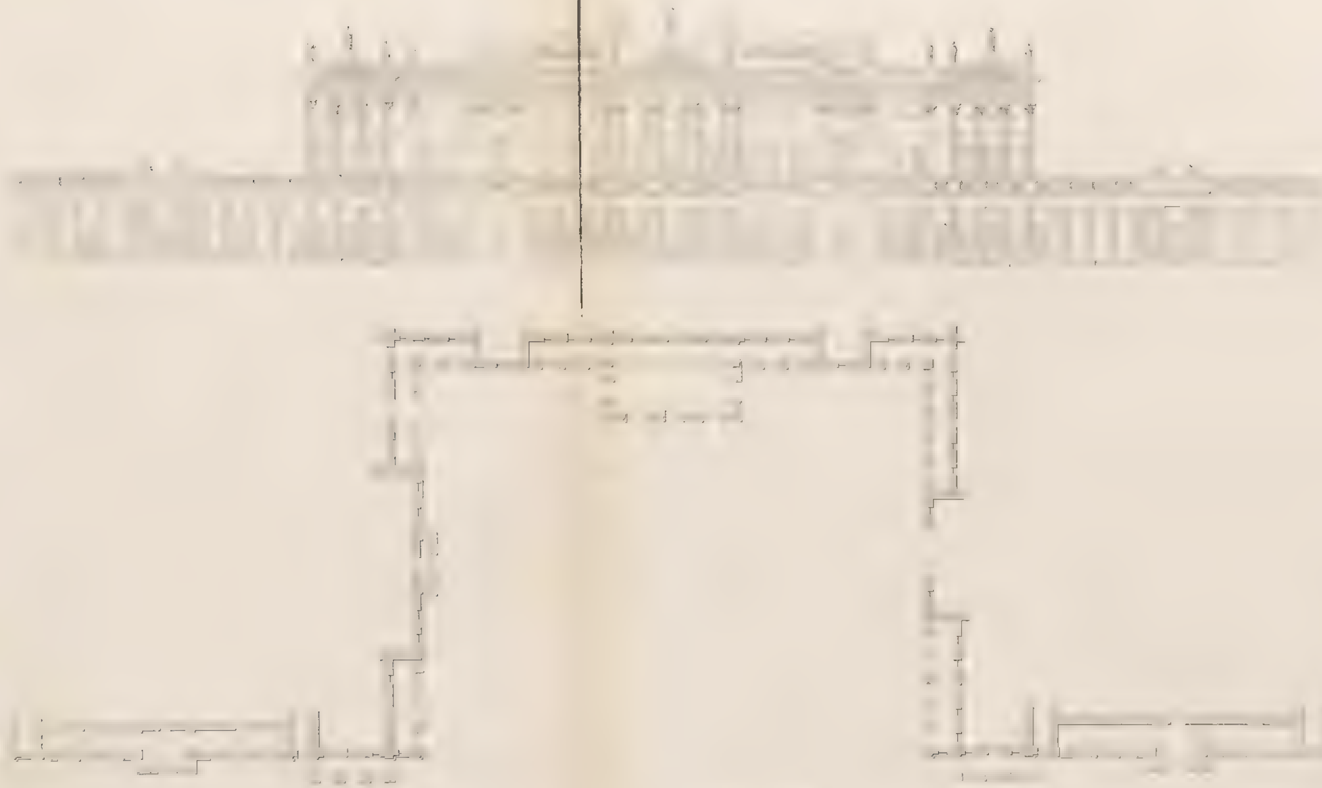
Restored by W. B. Clarke. *London. Published by Thos. Kelly, 17 Paternoster Row* *Engraved by F. Turrell*

PLANS AND DETAILS OF WALTHAM CROSS.



Drawn by W. B. Clark. Scale of feet. Engraved by E. Turrell.

London. Published by Thos. Kelly, 17 Paternoster Row. Jany. 1st 1848.



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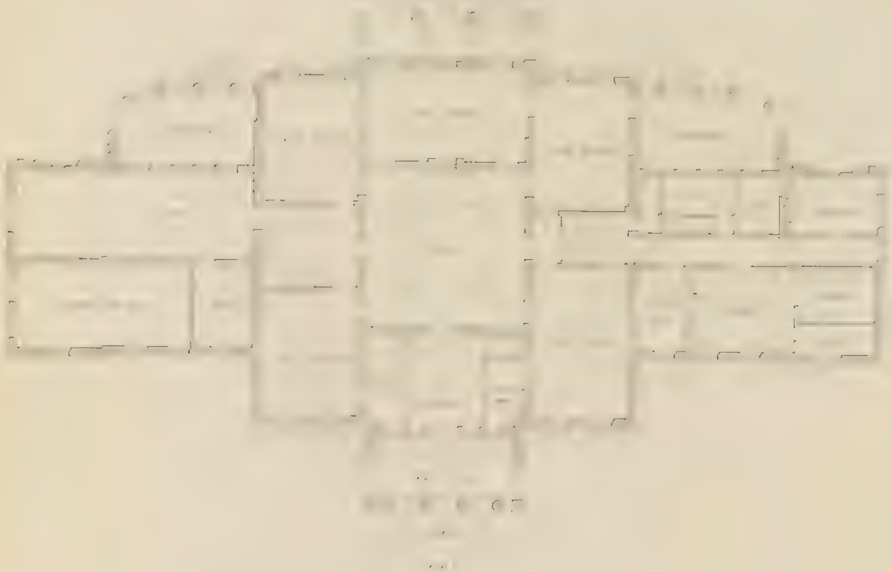

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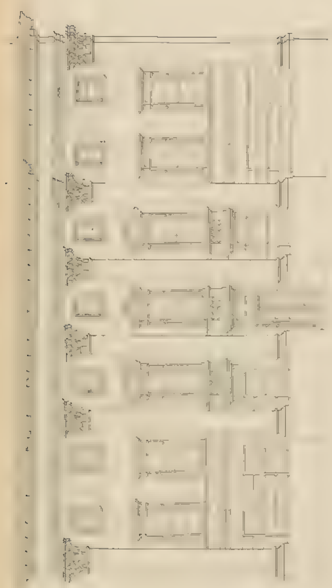

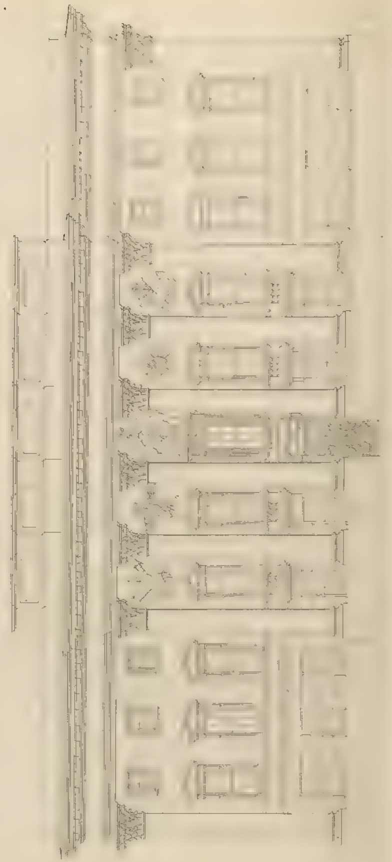

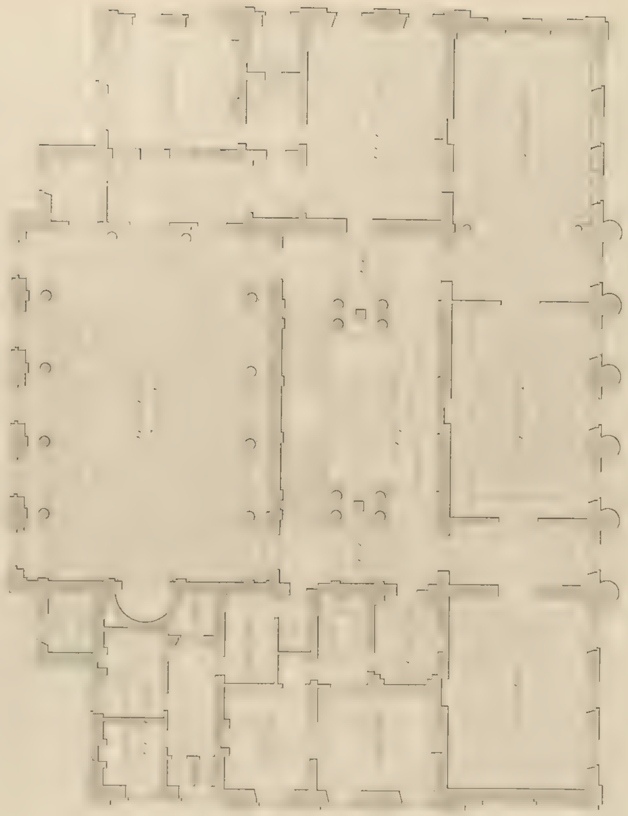

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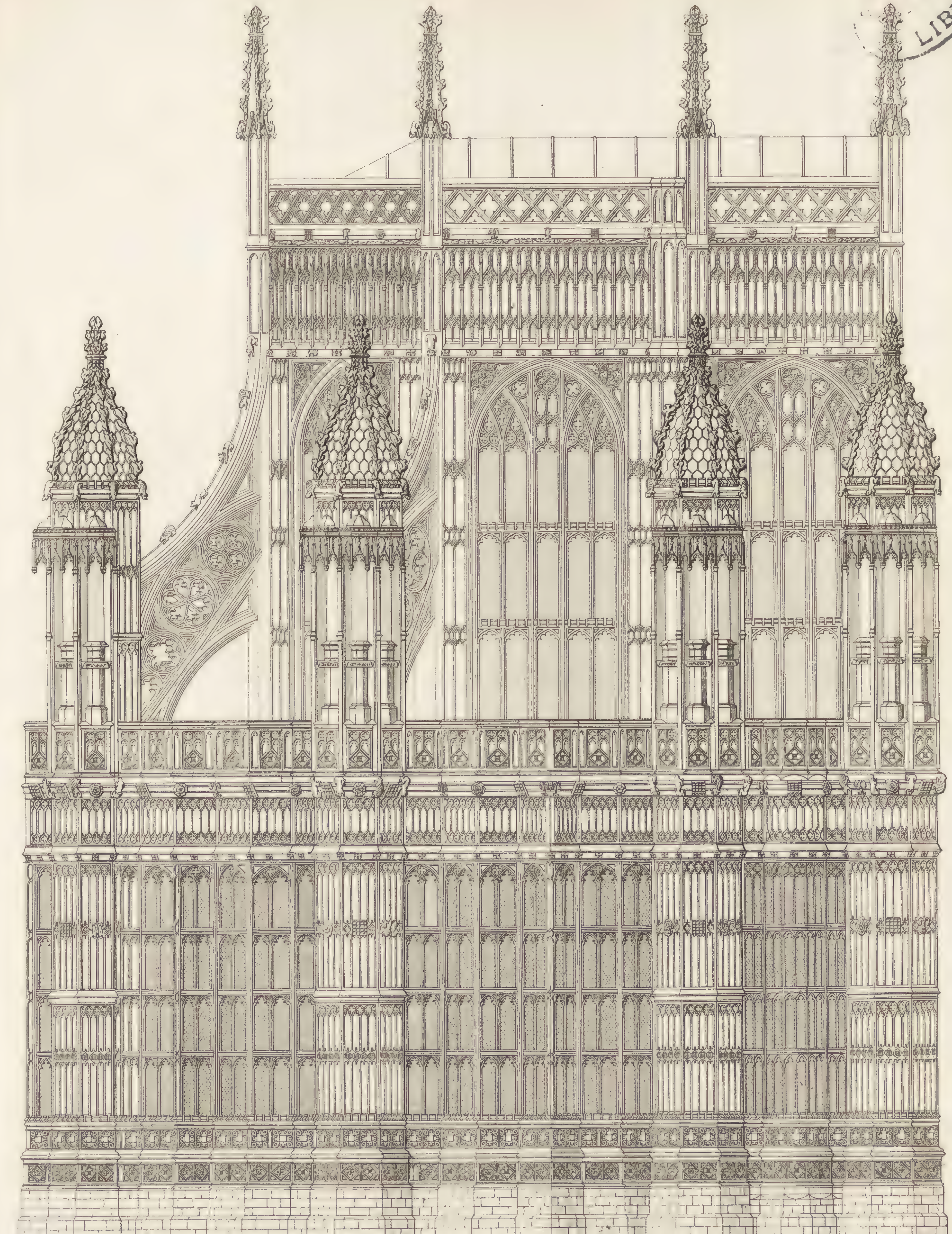
FRONT ELEVATION OF WESTMINSTER HALL.

London. Published by Thos. Kelly, 17 Paternoster Row, August 1st [illegible]

E. Tur[illegible]

PART OF THE NORTH SIDE OF HENRY VII CHAPEL.



W. B. Clark del.

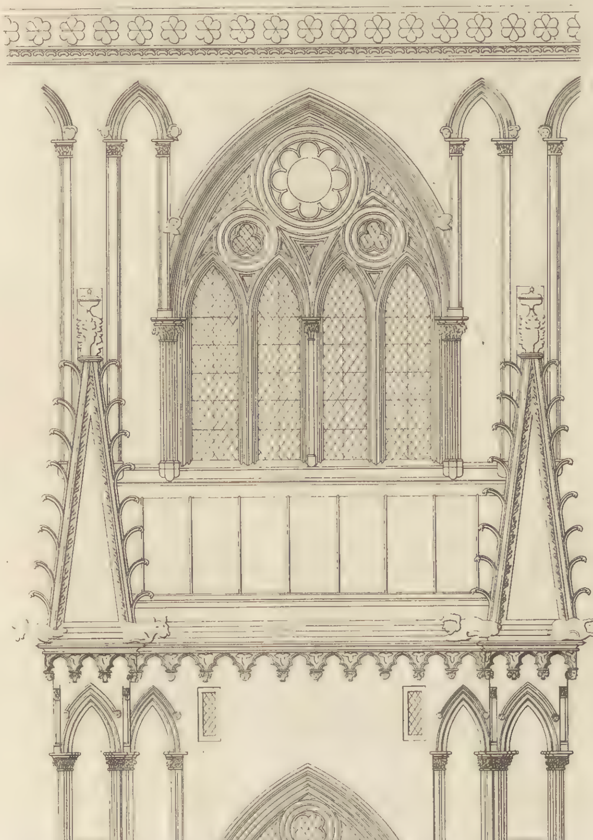
London Published by Thomas Kelly 17 Paternoster Row [illegible]

GOTHIC ARCHITECTURE.

PLATE XCII.

COMPARTMENTS OF THE INTERIOR AND EXTERIOR OF LINCOLN CATHEDRAL.

Part of the Exterior of the Nave.



Part of the Interior of the Nave.

0 10 20 feet

London Published by Thos. Kelly, 17 Paternoster Row. Augst. 1st. 18[illegible].

E. Turrell, sc.

GOTHIC ARCHITECTURE.

PARTS OF THE CHOIR AND TRANSCEPT OF LINCOLN CATHEDRAL.

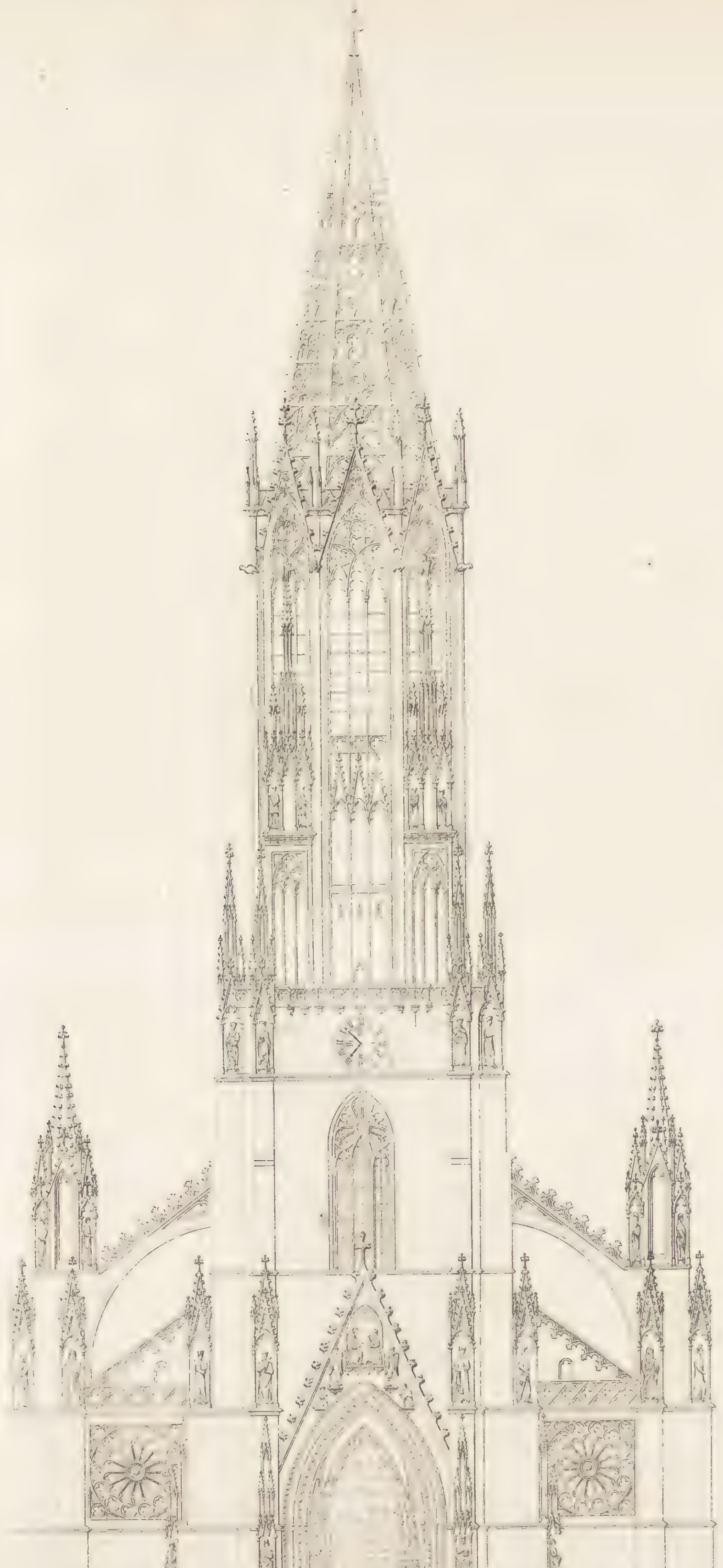
Transcept

Choir

London, Published by Thos. Kelly, 17, Paternoster Row, Au[illegible]

E. Turrell sc.

ELEVATION OF THE CATHEDRAL OF FREIBURG IN BREISGAU.



London Published by Thos. Kelly, 17 Paternoster Row, August 1st 1848

Engraved by

PARTS OF THE NAVE AND AISLE OF LINCOLN CATHEDRAL.

Interior Elevation of a part of the Nave.

Section through the Aisle.

0 10 20 feet

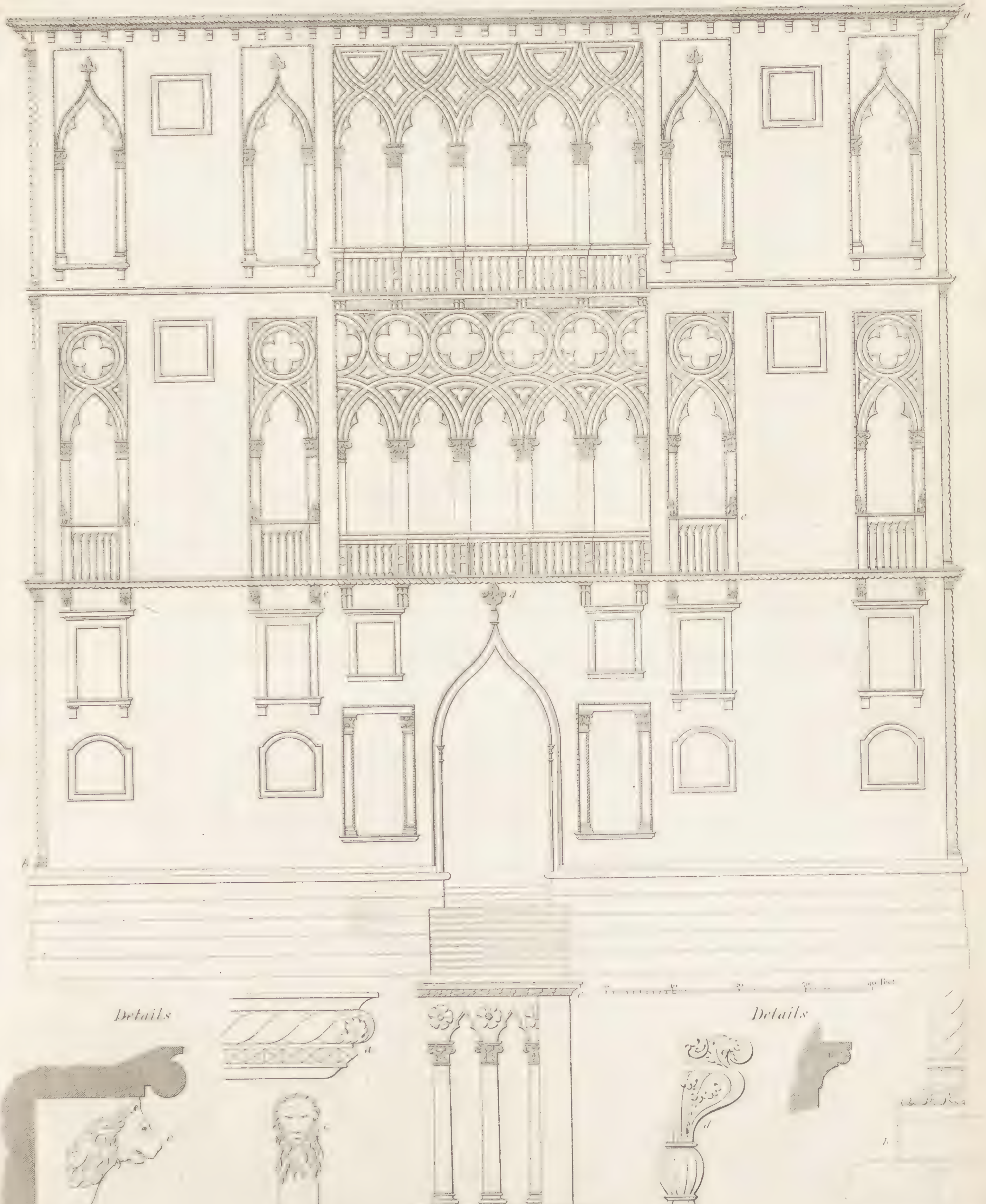
London. Published by Thos. Kelly, 17, Paternoster Row. Aug. 1st 1848.

E. Turrell sc.

GOTHIC ARCHITECTURE OF ITALY.

ELEVATION OF THE

PALACE GRIMANI ON THE GREAT CANAL, VENICE.



Drawn by Wm. B. Clark. London. Published by Thos. Kelly, 17 Paternoster Row. Jany. 1st 1848. Engraved by E. Tu[illegible]

EXAMPLES OF GOTHIC SCULPTURE OF THE 13TH CENTURY.

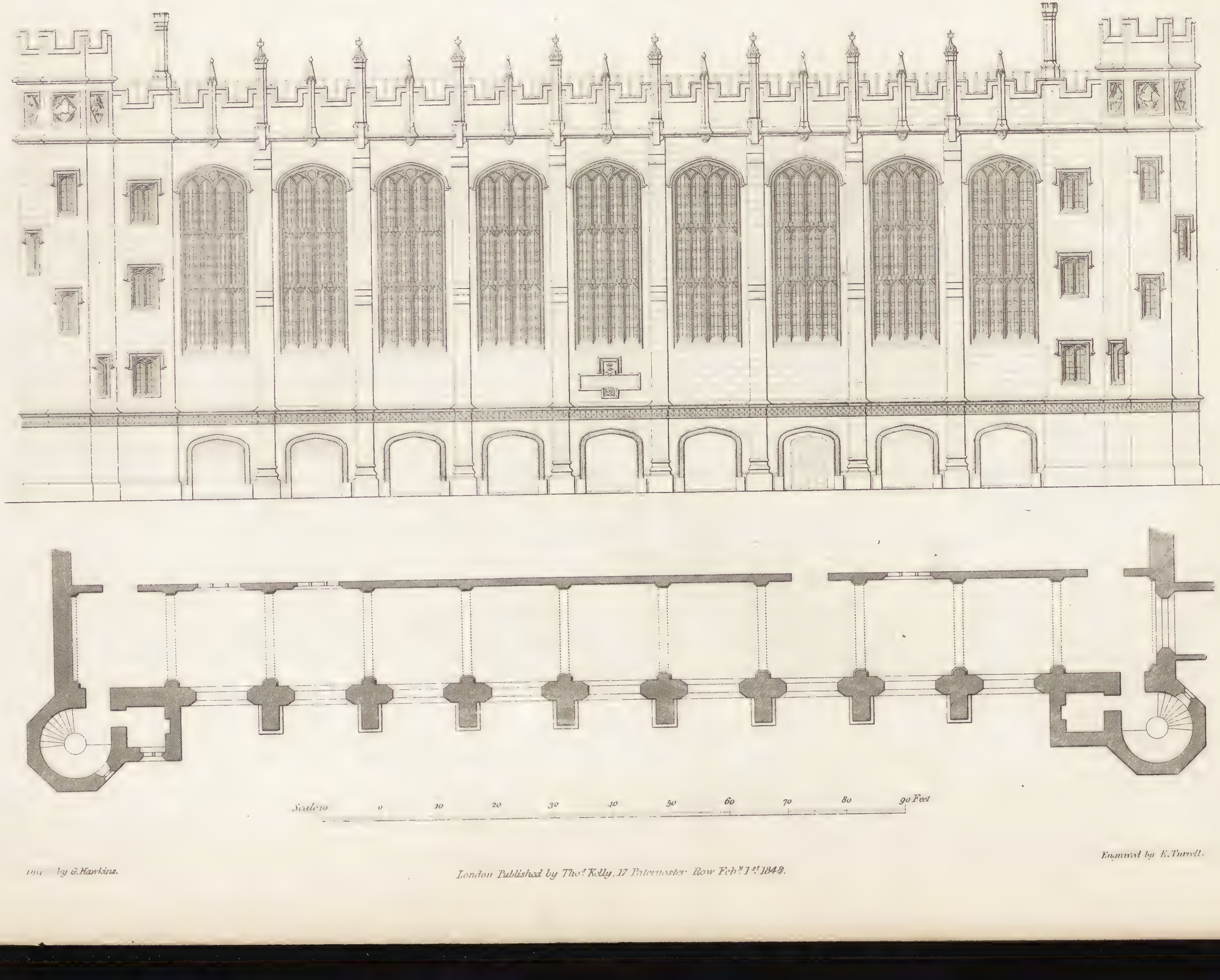
PLATE. XCVI

Drawn by W. I. Clarke

London Published by Thos. Kelly 17 Paternoster Row May 1st 1848

PLATE XCVI.

ELEVATION AND PLAN OF THE HALL OF CHRISTS HOSPITAL.



Scale 10 0 10 20 30 40 50 60 70 80 90 Feet

Drawn by G. Hawkins.

London Published by Thos. Kelly, 17 Paternoster Row Feby. 1st 1848.

Engraved by E. Turrell.

PLATE XCVIII.

SOUTH ELEVATION OF THE NEW CHURCH, CHELSEA.

Scale 10 0 10 20 30 40 50 60 70 80 90 Feet

Drawn by G. Hawkins. Engraved by E. Turrell

London Published by Thos. Kelly 17 Paternoster Row March 1st 1848.

FRONT ELEVATION OF THE CATHEDRAL OF NOTRE DAME IN PARIS.

PLATE XCVIII.2

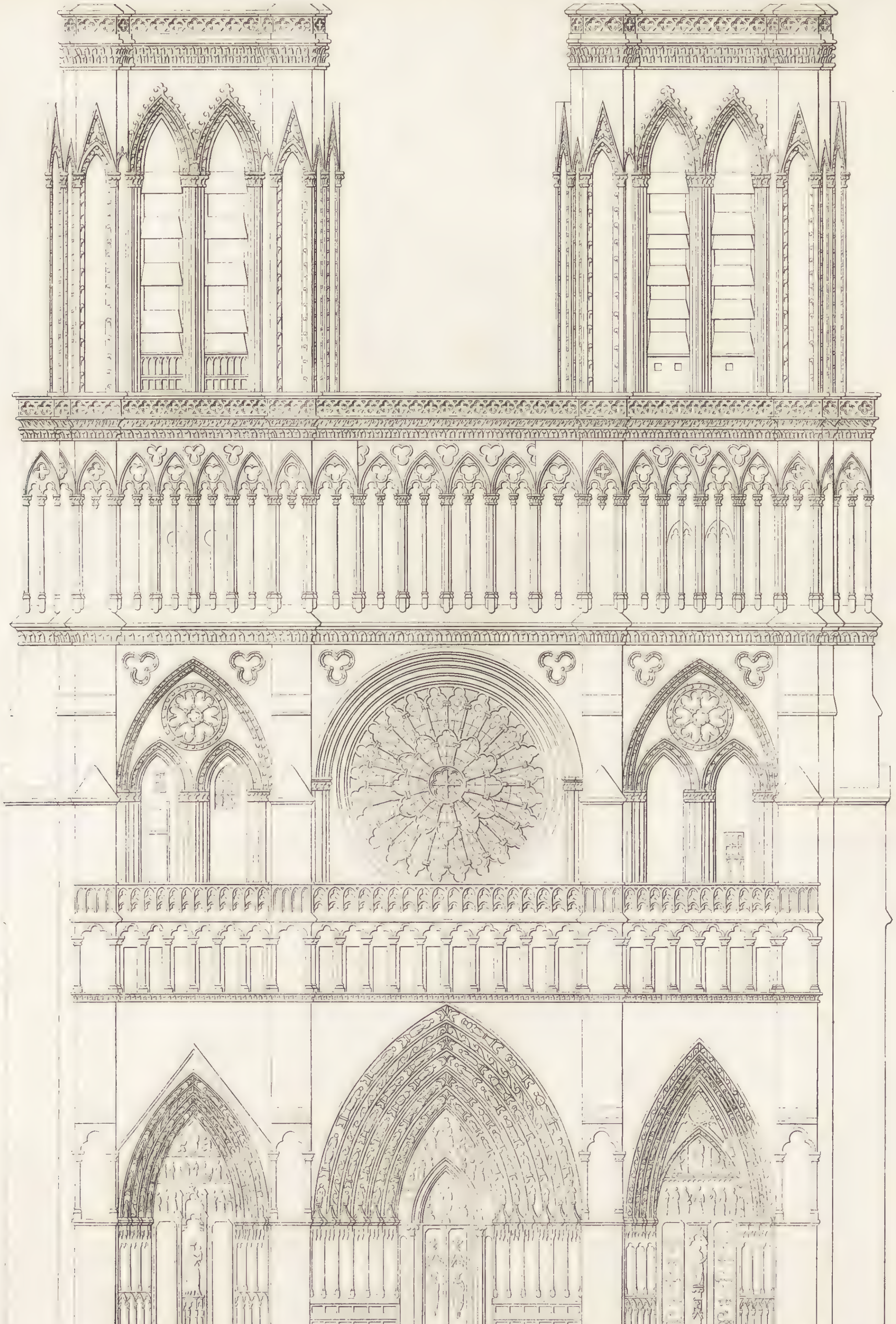


PLATE XCIX.

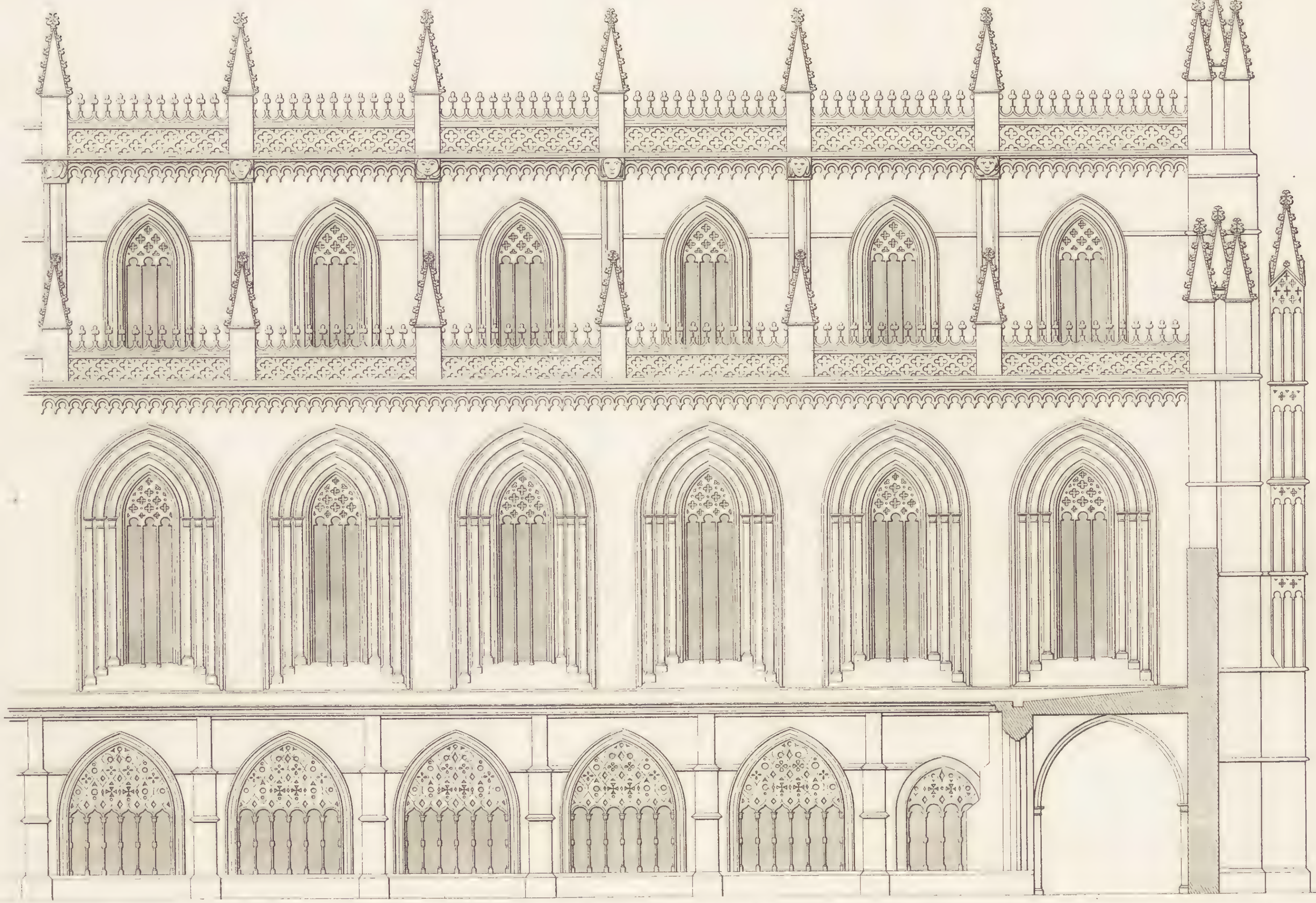
ELEVATION AND PLAN OF PART OF THE LADY CHAPEL ST SAVIOURS SOUTHWARK.

Drawn by G. Hawkins

Engraved by E. Turrell.

London Published by Thos Kelly 17 Paternoster Row April 1st 18[illegible]

NORTH ELEVATION OF PART OF THE CHURCH OF BATHALHA IN PORTUGAL.



Drawn by W. B. Clarke.

Scale of 0 10 20 30 40 50 60 70 80 Feet

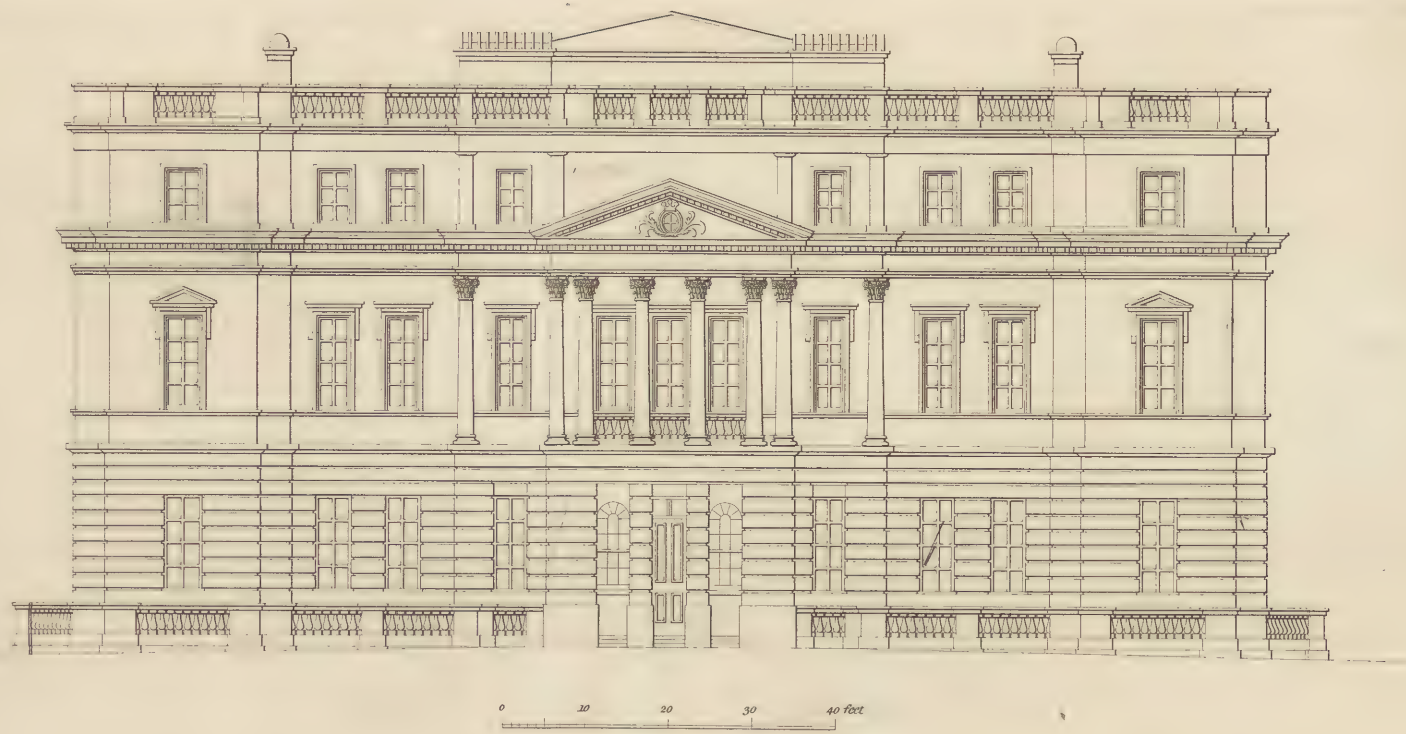
Engraved by E. Turrell.

London Published by Thos. Kelly 17 Paternoster Row May 1st 1848.

SECTION OF THE BASILICA OF S. FRANCIS AT ASISI.

STAFFORD HOUSE St. JAMES'S

North Front



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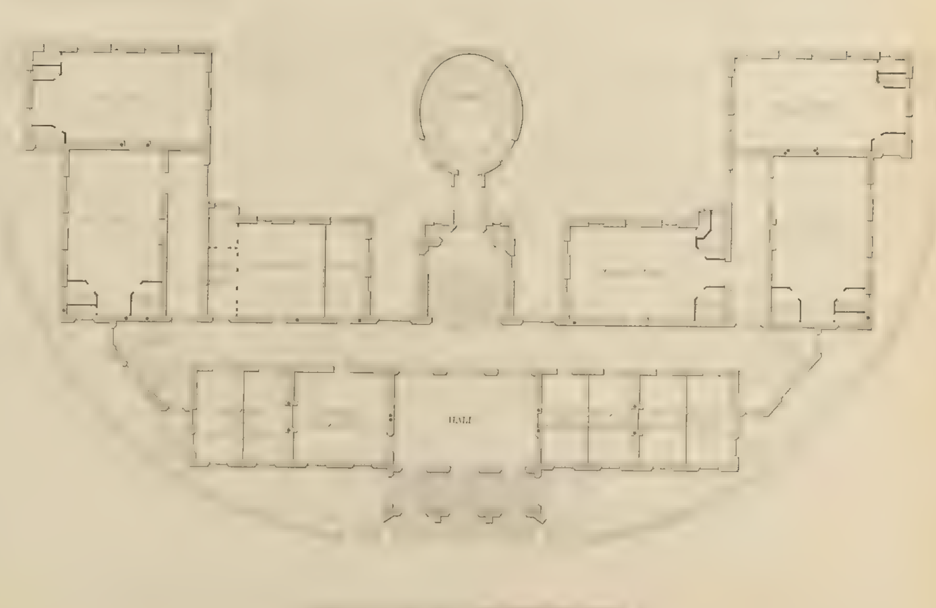
Engraved by E. Turrell.

London, Published by Thos. Kelly, 17 Paternoster Row, Feby. 1st 1848.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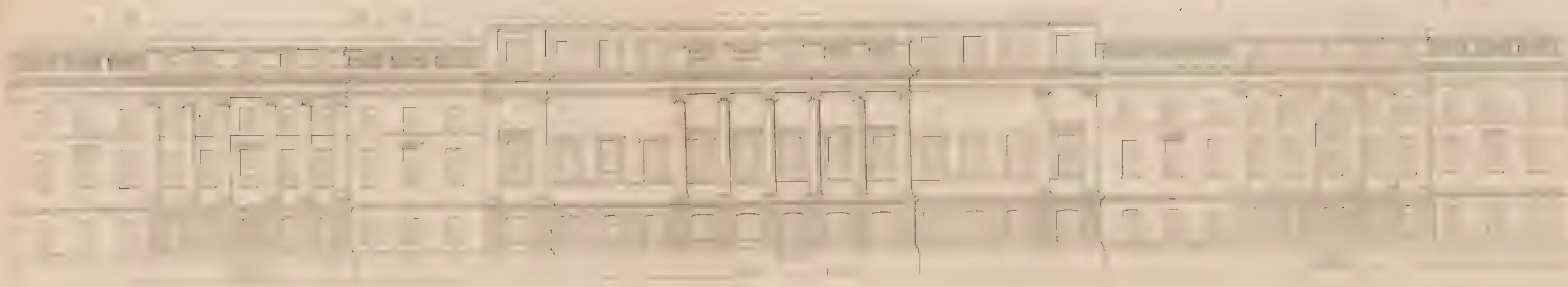

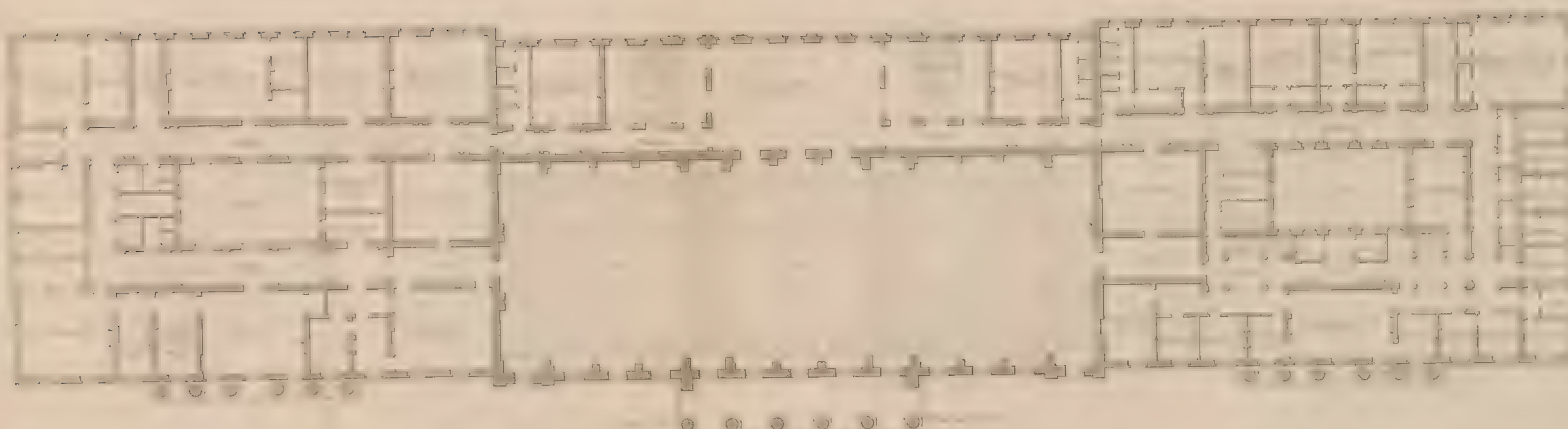

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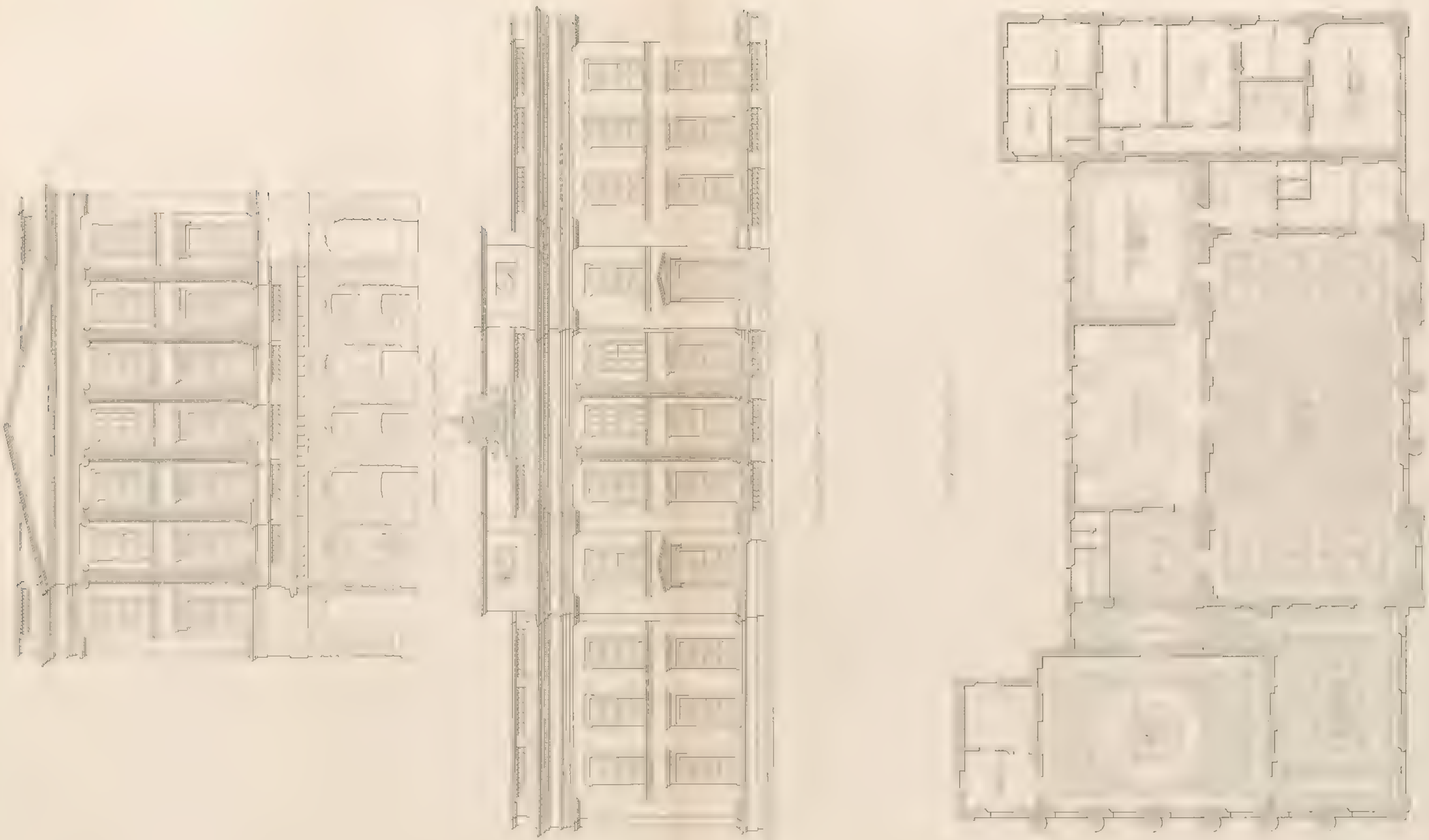
INTERIOR OF NORWICH CATHEDRAL

PLATE CV

London Published by The Renewer, Paternoster Row March 1st 1848

W. J. Bezzer del. et



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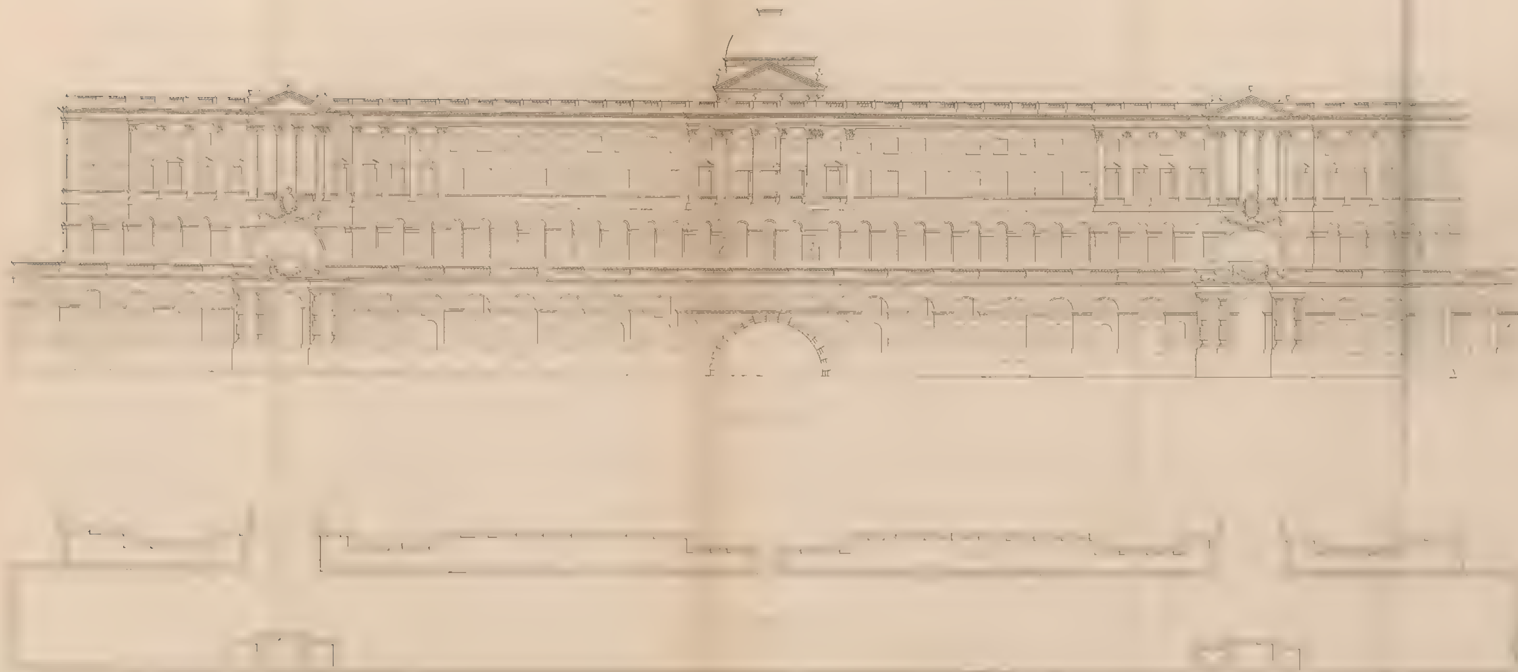

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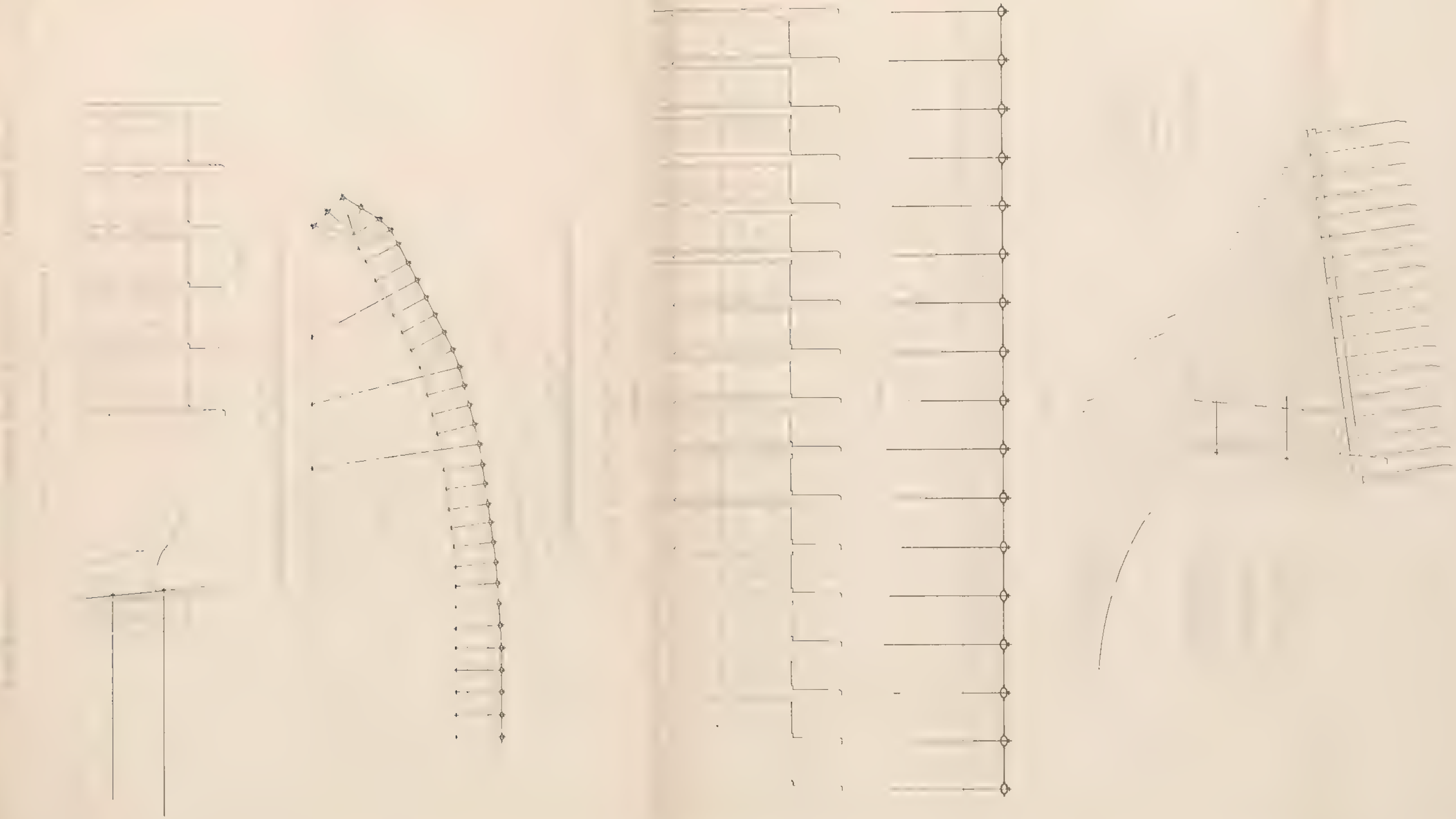

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